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Contractors in Conference

Problems still unsolved

CONTRACTORS meeting in annual conference this week again face a number of old problems some of which have become intensified while others are perhaps in process of solution.

Electrical contractors used to be the principal retailers of electrical appliances—a natural enough corollary. But department stores, ironmongers and electricity supply authorities have made great inroads into the trade. Thinking that unfair competition would be checked and chaos averted in the retail trade by organising the non-contracting electrical retailers into a national body, the E.C.A. formed the National Association of Electrical Retailers (having already set up a similar organisation for the radio trade). We are here concerned only with the radio retailers to record that the E.C.A. encountered trouble in both fields. The ironmongers had already formed an electrical section and although negotiations were opened it was not found possible to arrange a working agreement. The question of representation on the Fair Trading Council was one of the main stumbling blocks. And so this problem, upon the settlement of which an important part of the contractor's livelihood depends, remains open.

The hostility between the contractors and many supply authorities has been the subject of peace negotiations during the year, at the request of the Electricity Commissioners. The parties have at last got together again and maybe they will be able to work out some form of agreement. But this is a matter in which supply authorities are so deeply involved that a complete abandonment of trading activities is unthinkable. And yet the contractor must have more than the unwanted crumbs from the table of the municipal Dives. Co-operation has been found possible in many districts; why not in many more? After all, the live contractor is a useful ally; he can certainly not be considered a rival: so why not encourage him?

If it had been possible for the contractors to arrange a co-ordinated hire-purchase system on an adequate scale much would have been saved to them, but now the opportunity seems to have been lost—if it was ever practical politics.

Another direction in which the contractor is "up against it" is in the wiring field. E.C.A. members are bound to conform to good standards of workmanship and material. Thousands of so-called contractors outside the Association are not. The public, in its ignorance, pursues a false economy by allowing cheap unreliable equipment to be installed in its houses by ill-paid, unqualified practitioners. Even if supply authorities object (and some of them are not too particular) they are compelled to connect up if certain simple tests are passed. The Commissioners' regulations go some way towards securing better installations, but it is too easy to cover up defective work in which danger lies. Only by ensuring that qualified labour and sound materials are employed can a satisfactory installation be secured. This means compulsory registration, not only of contractors but of the operatives who actually do the job and cannot be subjected to unremitting supervision.

Voluntary registration of contractors has had a good run and no doubt has achieved much. It is clear, however, that it can never fully achieve its object and that in the end there must be legislation enforcing wiring rules and qualification. The matter has been taken up vigorously by the Association of Supervising Electrical Engineers and a national representative committee has been formed to pursue these desirable aims.

The question of wage rates, also mentioned in the report, is largely bound up with this subject. A registered electrician should be able to command a good standard wage—there should be no unregistered, and so the problem would settle itself. Pensions and holidays with pay are considered to be impossible while there are still non-federated employers. Mr. H. R. Taunton has something to say on this matter on page 913 of this issue.

Pinning his hope mainly upon the early achievement of complete Fair Trading and compulsory registration, the President ends his report on an optimistic note.

Reorganisation Proposals Criticised

IN the debate last Friday on the Ministry of Transport vote Mr. Burgin said that he was unable to deal with electricity that day as his time was fully occupied with road transport. On the previous day the McGowan proposals were attacked by the City Treasurer of Coventry at the conference of the Institute of Municipal Treasurers and Accountants. He saw no reason for "coddling" or interfering with the electricity supply industry, and proceeded to deal point by point with a number of the recommendations. His paper is summarised on another page. He was anxious that municipal authorities should not be deprived of their right to help the rates from electricity profits, but that, of course, was a city treasurer's point of view, and was objected to by Councillor Douglas, of Battersea, who failed to see why consumers should be thus indirectly taxed. The Borough Treasurer of Hornsey was not pleased at the prospect of a further large scheme, while, in his opinion, the Central Board's finances were surrounded by a certain obscurity. The small undertakings found a champion in the Mayor of Sutton Coldfield who spoke "feelingly."

Engineers from Overseas

NOT the least appreciated of the activities of the Institution of Electrical Engineers is the Conversazione which it holds every summer for those of its members who, normally resident abroad, are in England on leave or for business reasons. Last week, as in previous years, it was quite evident that those able to be present enjoyed the opportunity of meeting some of the leading people connected with the Institution as well as of exchanging experiences with engineers from other parts of the Empire and from foreign countries, none the less so because it is not easy for visitors sometimes to come across kindred spirits in the amorphous hugeness of London. It is, however, not only by such social functions that the Overseas Activities Committee of the Institution wishes to serve the interests of members abroad. Those anticipating a return to this country should, therefore, let the Institution know their plans in good time and write to us about them also.

Enterprising Rural Policy

THE difficulties of the past year have not deterred the Carlisle Electricity Department from pursuing a far-seeing development policy. Of the 47 miles of mains added, including twenty-four miles of high-voltage underground feeders, all but nine miles was provided in the outlying districts. The network now reaches about 120 villages and hamlets, many of which owe their early supply to the Electricity Committee's attitude of not stressing the need for an immediate economic return. The potentialities of such an area are demonstrated by the fact that the rural electricity consumption last year amounted to nearly a quarter of that in the city area, having risen by 33 per cent.

Through Foreign Eyes

IN stating in his paper that electrical engineering is the most international of all technical branches of industry, Mr. E. Mercier gave the keynote to the International Engineering Conference at Glasgow this week. Electricity has been developed almost simultaneously in leading countries, and, as he says, electrical engineers have formed common traditions that have facilitated the pooling of the results of researches and have led to healthy emulation. In the effects of State intervention he sees a major cause of differences in rapidity of development, depending upon the extent to which political questions have been permitted to influence economic considerations. Thus to the restrictive nature of early legislation in Britain, and not to any lack of ability among its engineers and administrators, he attributes the one-time backwardness of this country, whereas a more liberal outlook in France encouraged freer development, which did not lead to exploitation of the consumer. In the passing of the 1926 Act he sees a constructive effort that has stimulated progress (Mr. S. B. Donkin in his paper referred to the psychological effect of the grid as an additional gain), contrasting this with the unfortunate results of Government intervention in his own country three years ago in the matter of tariffs, which he finds has slowed down progress. The implications of this in regard to projected legislation in Britain should not be lost sight of.

Meter Testing

BEFORE the first of next month all undertakings should have made provision for testing their meters as required by the 1936 Act, or should have arranged with other undertakings to do so. In some further "Explanatory Notes" the Electricity Commissioners have modified some of the requirements of earlier memoranda with a view to meeting particular cases, while maintaining the high standard of accuracy required. What is most to the point in these Notes, however, is the emphasis laid on the need to employ men of the type called for by work of so exacting a character as the calibration and checking of sub-standard apparatus. That the design and manufacture of the equipment should be of first-class quality is obvious, but the care taken here will go for little unless the men working with it are fully trained, are chosen for real proficiency in testing, and are appropriately remunerated.

Grid Tariff for N.E. England

COMPLETION of frequency standardisation on the North-East Coast has enabled the Central Electricity Board to introduce a grid tariff for the area to come into force at the beginning of next month. In general form it is identical with the seven other regional grid tariffs, which, with the exception of N.W. England and N. Wales, have common kW charges starting at £3 10s. as a maximum. Local rates on selected stations, which are taken into account in determining cost of production, are based on a higher average figure (6s. 8d.) than elsewhere, and the increase or decrease of 2s. per kW installed for each 1s. variation from this basis is greater than in most cases. The running charge of 0.24d. per kWh is also higher, but the allowance of 0.0009d. per kWh for each penny by which the price of coal with a calorific value of 11,600 B.th.u. per lb. exceeds or is less than 15s. per ton is comparable with the figures for those areas in which the basic price of coal is similarly high. The effect of a rise in price of coal above the basis (which is to be expected) would therefore be somewhat less heavy than it would in those areas where the basic cost of fuel has been taken at from 12s. to 13s. 6d. per ton, in which instances the variation is 0.001d. at the local standard calorific value.

Natural Knowledge

IN a foreword to the A.S.L.I.B. list of scientific and technical books, a new edition of which has now been issued, Sir William Bragg states that popular books on science are much more common in Britain than in most other countries—evidence of the growing belief that science should enter into the education of the citizen and also that hitherto it has not done so. In common with such men as Faraday, Huxley and Tyndall, Sir William believes in making it possible for the ordinary person to understand the elements of scientific discovery. As he reminded those present at the opening of the new radio-therapy department of Middlesex Hospital recently, the founders of the Royal Society included in its full title the words "for the improvement of natural knowledge." Regarded as "natural knowledge" science loses its pretence of being mystical. Men with a scientific outlook on life, as an extension of their natural faculties, are far more likely to have a commonsense respect for the qualities of its specialised practitioners and also to use for their proper beneficent purposes the discoveries of scientists.

[*Photochrom*

The twelfth Annual Conference of the Electrical Contractors' Association and its Allied organisations is now in progress at Hastings, having commenced on Wednesday evening with a reception by the President, Mr. H. E. Walker, at the White Rock Pavilion, also the scene of Thursday's business sessions and the Mayor's reception in the evening. The Friday programme comprises the annual general meeting and installation of the new President, a garden party in the afternoon and a ball and cabaret at the Queen's Hotel (Conference Headquarters) in the evening. The annual report and the papers presented on Thursday are dealt with in this and subsequent pages. Next week we shall publish a report and photographs from our representatives at the Conference

The Annual Report

THE report for the year 1937-38, to be presented by the President on Friday, states that the membership of the E.C.A. rose by 89 to over 1,750, and there are now 58 main branches and 19 sub-branches. To facilitate the business of the associations it is proposed that the number of sectional boards (six at present) shall be doubled and their membership of representatives from the branches increased. At the same time the number of members of the Council, nominated by the sectional boards, will be reduced from 48 to about 30. It is also intended that an annual meeting shall be held in each section which the president or vice-president will attend with the chief executive officer.

Referring to the National Associations of Radio and Electrical Retailers, the report says that the Council's action in establishing them has been seriously misinterpreted. The N.A.R.R. was formed by N.E.C.T.A. in response to the request of a large number of those engaged in the radio industry, and it hopes by constructive efforts to find a solution for the radio chaos which prevails at present.

The active operation of the N.A.E.R. has been delayed pending important negotiations with the Ironmongers' Federated Association, which, however, have not been productive of the good which was expected from them. The report states that while N.E.C.T.A. is empowered to admit to membership retailers who are not also contractors it has not attracted any substantial body of such traders. Therefore the formation of such a body as the N.A.E.R. was considered to be the duty of N.E.C.T.A. to the industry as a whole. It is regarded as important that electrical retailers, no matter what other business interests they have, should be welded together in one body specialising exclusively in electrical problems.

Appreciation is expressed of the happy relations that exist between many supply authorities and their local contractors. During the year, at the request of the Electricity Commissioners, there have been several meetings between representatives of the I.M.E.A. and the E.C.A. The interests of members are being fully attended to but the electrical contractor did not want to stand in the way of progress.

An increasing respect for the principles of the Fair Trading Policy is reported, and it is hoped that the time will arrive in the near future when the responsible sections of the industry will issue the Policy as a mandatory document. Reference is made to negotiations with the E.L.M.A., the C.M.A. and the Accumulator Makers' Association and to meetings with representatives of the National Register of Electrical Installation Contractors. A scheme for securing identity of membership of the two organisations has not materialised, although the setting up of a liaison committee has been a good result of the negotiations. The Association's support of the principle of compulsory registration of contractors and operatives, is reiterated, and mention is made of the work of the A.S.E.E.* As a result of negotiations between the N.F.E.A. and the Electrical Trades Union, a document relating to a national code of working rules is likely to be submitted to the National Joint Industrial Council in the near future. Progress has been made with the scheme for re-zoning the country to secure more equitable standards. No appreciable progress has been made with regard to the movement to secure the legalisation of voluntary agreement. Members of the N.F.E.A. in many parts of the country are suffering from the wage-cutting of non-federated firms—and certain supply authorities.

Mr. H. E. Walker, President of the E.C.A. and Allied Associations

Consideration has been given to a report by a committee of the Council with pensions for operatives; but here again the non-federated employer is the stumbling-block. Another matter is holidays with pay, the principle of which is accepted by the N.F.E.A. It is believed that the problem of the large "floating population" employed in the contracting industry is capable of solution, but again the non-federated employer would have to be placed under similar obligations.

With regard to the future, the report is optimistic. There are limitless prospects for the expansion of the electrical industry, and Mr. Walker can see no logical reason why present difficulties should not be solved in the near future. He calls for an optimistic outlook and enthusiastic support for the aims of the Association, and in conclusion expresses his thanks to all who have assisted him during his year of office.

**Vide* Mr. Alan Kirk's article on page 909.

Holidays with Pay

Paper by A. G. Bruty, M.I.E.E. (Past President)

ALL good employers agree with the principle of an annual holiday with pay for their workers, and recently the Parliamentary Committee on the subject has pronounced in its favour. It may be maintained that wage rates in such an industry as electrical contracting are fixed to give a margin to cover holidays and slack time, but the author considers the argument a weak one. Also, it is said that holidays with pay merely represents a compulsory increase in wages which is true if the pay and not the holiday is taken.

In 1936 the Irish legislature passed the Conditions of Employment Act, Clause 24 of which provides that an employer shall allow to each of his workers in any industrial under-

taking not less than six consecutive days' leave for every complete working year of not less than 1,800 hours. In the case of an employé leaving the employer must give him six days' leave before he goes or pay him a day's wages in respect of each completed period of two months (300 hours) and for the balance of his service if it is not less than one month (150 hours). Work on Sunday or a public holiday is forbidden, but if the worker has been in his employment continuously for four weeks (150 hours) and has worked 20 hours in the preceding six days a day's pay shall be given for a public holiday. Christmas Day and St. Patrick's Day are compulsory holidays, but there are four other days for which substituted days can be given.

The author's experience over two years shows that while the Act secures the desired end so far as men in continuous employment are concerned, it merely provides extra pay for the large group of casual employés. He has found that when such men are dismissed after working, say, 13 weeks they demand, and receive, two days' "holiday money," and frequently enter other employment immediately. In this way they receive about 2.8 per cent. additional pay, or more if public holidays are included.

It remains therefore to secure that men actually take the holidays for which they are paid. The author considers that the problem can only be solved on the basis of tokens or stamps, or a savings book. His proposal is that the payment for the six public holidays and the six consecutive days' annual holiday should be merged and 1/26th of the amount of the wages paid during the period of the engagement credited to the workman. It would not be possible for him to draw his holiday pay until he had actually worked 51 weeks, when he would receive a fortnight's holiday pay which would enable him to take a week's holiday in comfort. The savings book would be kept by the employer during engagement and lodged with the Labour Exchange during periods of unemployment. A measure of State control would be necessary with this scheme.

The arrangements for releasing the permanent staff in his concern for their six days' annual leave have worked quite well, due to the co-operation of all concerned in seeing that no inconvenience is caused.

As to the effect on costs, it will be seen that actually a man receives 3.87 per cent. of his income without work if fully employed, the percentage rising in the case of casual labour to 7.3 per cent. in Eire or 5.75 per cent. in the United Kingdom. These figures call for serious attention when preparing estimates. Mr. Bruty has found that the additional labour cost in his business is actually just over 4 per cent., representing an increase of 1.6 per cent. in the cost of the work, or a reduction in profit from the reasonable figure of 10 per cent. to 8.4 per cent. As a good deal of sales are of price-controlled articles something in the neighbourhood of 2½ per cent. on contract work must be charged to recover the cost of holidays with pay, depending on the nature of the business.

[*Lafayette*
Mr. A. G. Bruty

The author does not think that a scheme of holidays with pay can be set up in the United Kingdom electrical contracting industry without statutory enforcement, owing to the existence of contractors who are not members of the Association. Moreover, any such scheme adopted by Association members would put them at a still greater disadvantage in competition with the "army of hangers-on to the electrical contracting industry who bear no allegiance to any standard of practice and conduct." Therefore, the realisation of holidays with pay means legislation.

Contractors Should Supply Fittings

Paper by W. Cross, M.I.E.E, (Past President)

THE actual title of this paper is "How to Avoid the Exclusion of Fittings and Apparatus from Electrical Contractors' Contracts." At some stage of any electrical contract it is necessary to settle what fittings and appliances are to be used, or, at any rate, the approximate cost. If this is done before the specification is issued the work can proceed more cheaply and expeditiously, as all the interested parties can visualise the complete job before the work is commenced.

For the sake of his reputation, and to make a profit, the contractor must keep in touch with the latest developments, know the best markets, and see that the complete installation is satisfactory in all ways to the purchaser, and therefore to the architect or consulting engineer. If the fittings and appliances are not definitely settled, or if the contractor can put forward more suitable equipment, he must submit alternative proposals.

Fittings and appliances are sometimes excluded from contracts because the contractor does not take sufficient interest in the work to ensure that the installation is satisfactory in all respects. He may ask the manufacturer or his agent to submit samples and particulars to the purchaser or architect instead of performing this service himself. The manufacturer, agent or wholesaler often approaches the architect or purchaser direct and offers a discount. The purchaser thinks he is getting a cheaper job by buying direct; but in many cases, if the agreed Fair Trading clauses are observed, he could buy as cheaply through the contractor. In any case, no manufacturer can offer so great a variety as the contractor, who is, or should be, in touch with the latest developments and knows the essential requirements of the particular installation.

The discounts mentioned in the Fair Trading Policy, however, vary with the type of fitting and appliance, and also whether the fitting is selected at a showroom or from a catalogue. It might be well to define the list price of fittings in the contract as subject to the smaller discount, and to state that if ornamental fittings are selected from a catalogue a further discount will be allowed. Then, again, the fittings may be included in the contracts of the shopfitter, decorative specialist, or other sub-contractor, who rightly wishes the fittings to be suitable for his scheme. The arrangement suggested at various times by a well-known E.C.A. member by which the supplier always reserves a discount for the fixer would overcome this trouble.

In the original specification, the fittings and apparatus should be included, preferably in detail, or at least by mentioning a list price, which would be subject to a standard discount to the firm obtaining the contract. The Fair Trading Policy should be observed. When the fittings, &c., are supplied by a specialist and fixed or connected by the contractor, an agreed discount of, say, half the standard rate should be payable by the supplier specialist to the electrical contractor, or by the purchaser to the contractor.

In this way the purchaser obtains a properly designed job at a reasonable price and knows the cost beforehand. The architect or consulting engineer deals with one firm, namely, the electrical contractor; he still can obtain the most suitable fittings and apparatus, and save himself trouble by having few modifications during the progress of the work. The manufacturer spends less time in selling his products to contractors who know the features of various fittings and apparatus, and can place repeat orders. The contractor can take a greater interest in the complete installation, and, knowing the conditions when tendering, can make a better profit. He must, however, keep in touch with the latest developments.

Advertising Technique and Morality

Paper by W. I. Jones (Member of Council)

IN opening his paper Mr. Jones says that it is assumed that advertising is a necessity and then proceeds to mention ways in which the professional man endeavours to keep himself before the public eye, proceeding as though advertising was the last thing in his mind.

He mentions such matters as subscriptions to charities, political associations and religious organisations and various forms of social contacts. The case is mentioned of a former member of the Association who obtained a post in a very important manufacturing firm mainly by his golfing handicap and his ability to "mix." His firm regards the money which it has to pay him for salary and expenses as well spent in the entertainment of important customers. This form of advertising is so effiacacious because it is so personal. A less direct, but still personal, contact, is by the use of the trained canvasser; but he must be trained—"an untrained man scratches the soil and the weeds grow."

Mr. Jones considers that the public address system is not a suitable medium for contractors' advertising. It lacks the personal touch which seems to be inherent in it and is costly to buy and operate.

After the ear the next great personal appeal is to the eye.

Careful window dressing is of very great importance. Goods properly displayed always look better in the window and that is why the author counsels the avoidance of the "goods on approval" system. Turning to newspapers, the author maintains that these are run primarily for profit obtained from advertisers. Nobody buys a paper to look at advertisements. "Your newspaper proprietor knows this and so he sends you a copy free of charge so that you can see the glory of your own advertisement and the feeble attempts of your competitors." To get the public to notice an advertisement various forms of guile must be resorted to. Mr. Jones commends the house magazine as a good form of semi-personal advertising.

[*Whitlock & Sons, Ltd.*
Mr. W. I. Jones

The buying public is feminine and so advertisements must appeal to women who read with greater difficulty than men. Consequently in any advertisement a carefully chosen picture block is essential; the less put in besides, the better. Beauty in itself is attractive and margins are more valuable than print to set off an illustration. The use of comic cartoons and "story strips" serve a good purpose but the latter are being overdone. Cinema advertising is pretty and effective but promises more than it performs. It fails because it interrupts a more paramount interest.

It is difficult to gauge the success of advertising. One has to take space on faith and trust in one's ability to use it well. If a general line of goods is advertised competitors benefit too, and so it is better to advertise very exclusive lines; this is why manufacturers offer to pay half the cost of advertisements.

Two words should never be used where one will do and not more than one idea at a time should be attempted. Constantly repeated slogans are effective. A statement should always be positive—never comparative, superlative or negative. Statements directed at rivals encourage reprisals. The public is not interested in private quarrels and has a sense of justice.

Mr. Jones utters a warning against negative advertising of the kind that attempts to stimulate a public demand for better wiring by pointing out the danger of electric shock. "Let us advertise sound installations for their own sake by all means, but the risk of shock should be a technical matter exclusive to the industry."

Courage and variety are needed in advertising and the author concludes "be honest with yourself, and do not make claims which you cannot substantiate. And be honest with your competitors. Faith and hope are the beginning of advertising morality, for without them you will never make a beginning. Honesty and courage are essential to its continuity, and without continuity your effort is wasted."

Insurance for Contractors

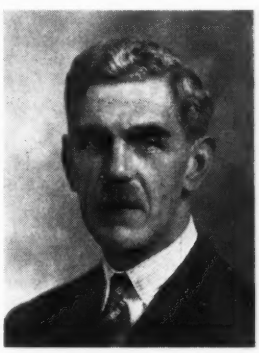
Paper by E. A. Reynolds, M.A., M.I.E.E. (Member of Council)

IN his introduction the author stresses the necessity for the contractor to guard himself against various forms of risks and then proceeds to deal with the principal methods of insurance protection.

Dealing with workmen's compensation he mentions that various companies specialise in this class of insurance, offering rates which vary with the type of employment. After investigation of the policies available, N.E.C.T.A. recommends that of the Midland Employers' Mutual Assurance, Ltd., as being the most favourable for contractors. The premium is based on the total wages paid annually and for ordinary contracting work the amount is 9s. per £100 with additions to cover special hazardous work. The office staff can also be covered at the rate of 2s. per £100 of staff wages.

Contractors do not always realise the extent of their liability under third-party claims. This liability for the acts of employés or agents may range from a few shillings for a broken pane of glass to thousands of pounds for an extensive fire; and for personal injuries from bruises to fatal accidents. In this connection N.E.C.T.A. has arranged a policy with the Phœnix Co. with reasonable premiums and greater cover than most other policies. Liability for damage continues after the completion of a contract and a policy has been arranged and the premium paid by N.E.C.T.A. to cover all its members up to £20,000 for any one claim. The risk of claims arising in respect of damage or injury caused by employés using their own motor bicycles or cars can be met by an extension of the third-party policy at the rate of 10s. per annum for each vehicle. N.E.C.T.A. has arranged to cover members above the maximum of £10,000 (up to £25,000) fixed by insurance companies for fire damage. Another policy taken out by the Association covers members against claims arising from the indemnification of municipalities and other bodies against claims arising from a contractor's default or negligence.

Mr. Reynolds mentions the advisability of a policy to cover loss through fire on premises, stock and equipment, and then deals with the insurance of work-in-progress risks. A policy can be taken out to cover a floating amount but a special policy should be arranged for specially large contracts. Here, again, a special policy has been negotiated by N.E.C.T.A. to meet members' requirements.



[*Lafayette*
Mr. E. A. Reynolds

The insurance of cash in transit (from bank to office or from office to works) can be effected for a small premium, and goods loaned or hired out can also be protected. Other things which it may be advisable to insure against are loss of profits and incapacity of partners or managers through illness or accident.

Mr. Reynolds then proceeds to deal with the cost of insurance and mentions that the greatest item is State health and unemployment insurance which, for male employés, ranges from 2.6 per cent. on wages in Grade A districts to 3.32 per

[*Photochrom*

Two picturesque parts of Hastings: Left, St. Leonards Gardens; right, The Castle

cent. in Grade D districts. The figures for girls average 0.20 per cent. of wages paid to operatives.

The percentages on wages of other forms of insurance are as follows:—Workmen's Compensation, 0.45 per cent.; third-party, 0.20 per cent.; fire risk on work-in-progress, 0.15 per cent. (based upon a quarter of a year's turnover—about equal to the total wages for the year); fire insurance of stock, 0.05 per cent. (average); fire insurance of premises and plant, at the same rate as for stock, only a small amount; and cash in transit, 0.1 per cent. The other sundry insurances mentioned cannot be expressed in terms of wages and are therefore not taken into the computation.

The total of the voluntary insurances is therefore 0.95 per cent. of wages paid and with the compulsory insurances the following totals apply to the various grades:—A, 3.75 per cent.; B, 4.15 per cent.; C, 4.33 per cent.; and D, 4.47 per cent. These percentages must be added to the cost of labour on any contract or estimate in order to arrive at the total cost of the work and contractors should make sure that they are covered for all the risks to which they are liable.

Discharge Lamps for Interior Lighting

Paper by W. J. Jones, M.Sc., M.I.E.E. (Manager, Lighting Service Bureau)

ALTHOUGH electric discharge lamps are well accepted for street lighting their advantages for interior lighting are not generally realised and real sales efforts are necessary to convince customers of their value.

In their installation these lamps require separate chokes or transformers to limit the current, and condensers, on economic grounds. As mercury lamps upon being switched on take about double their normal current the wiring must be adequate to carry it without excessive voltage drop which would lead to lamps at the far end of a circuit only reaching their "blue glow" stage.

[*Elliott & Fry*
Mr. W. J. Jones

The characteristic colours of mercury and sodium lamps may be beneficial rather than disadvantageous. Mercury lamps can be colour corrected and the time may come when this will be accomplished with an actual increase in efficiency. A deficiency of red rays is compensated for by the inclusion of cadmium in the inner tube or the lamps can be employed in conjunction with tungsten-filament lamps which incidentally act as the current limiting device and do away with chokes and condensers. Fluorescence is another means of correcting colour with almost unlimited scope. At present it is applied only to the 400-W size, but 80-W and 125-W sizes may be expected in the not-distant future. While in the 400-W lamp only 12 per cent. of the energy is emitted as visible light, there is 15 per cent. of energy available in the ultra-violet for improving efficiency and colour. The colour of sodium lamps may also be modified, to a lesser extent, by similar means.

In considering the economics of the discharge lamp, it can be taken that except where lighting is used for a very short period per year with current at low rates, it has the advantage, particularly if the larger sizes can be used. The aim should not be to provide the same amount of light at less cost, but rather to provide a greater quantity of light to improve working conditions and thus increase production and profit.

Discharge lighting is generally more effective for industrial use. The replacement of 500-W tungsten lamps by 400-W mercury lamps would give about double the light on the working plane and do away with the need for local lighting. Mr. Jones quotes examples of effective lighting in a foundry and a printing works and gives a comprehensive list of cases in which discharge lighting has proved especially advantageous. In the rare cases in which a stroboscopic effect is experienced it can be remedied by connecting adjacent lamps to different phases.

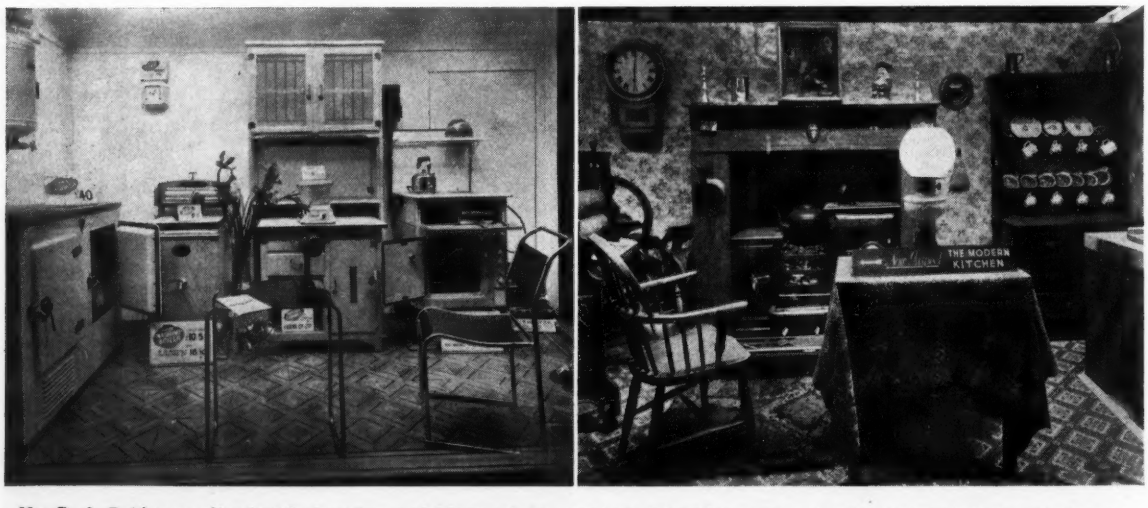
In shops and offices where the cost of electricity for lighting is generally higher, the economic case for discharge lighting is a strong one. Sodium lamps may be used occasionally for shop windows and for interior decorative effects, while mercury lamps can be used with tungsten lamps both for interiors and windows. It is not possible to say exactly what proportion of mercury and tungsten lighting will give a daylight effect. A proportion of (say) 800 W of tungsten to 300 W of mercury will give a close approximation to daylight when the light falls on a white surface, but on a coloured surface the discontinuous spectrum results in some colour distortion, which, however, can be reduced to a negligible level. In offices an 80-W mercury lamp with a 200-W tungsten lamp will give a pleasant quality of light. Fittings of this kind are available, and in an office 35 ft. by 25 ft. by 13 ft. high six of them will give 10.5 ft.-candles against 7 ft.-candles from an equal wattage of tungsten lamps. The most perfect blending will occur with indirect lighting, by which means the same or more light can be obtained at no greater cost than with the previous "general" lighting.

For shop interiors a wattage proportion of 2 mercury to 3 tungsten will give good colour rendering of black and white, grey, green and yellow; red is only slightly dulled, but some blues tend to appear more mauve than they really are: a 4-to-1 tungsten-mercury combination will usually cure this trouble.

Discharge lighting is very suitable for shop windows, and a combination of an 80-W mercury and two 150-W tungsten lamps is generally satisfactory. Where red and blue are not prominent the proportion of tungsten may be reduced to two, or even one, 100-W lamps. It is better to group each mix to avoid separate shafts of tungsten and mercury lighting being evident on the display.

To enable a shopkeeper to change over from mercury to tungsten lighting the Lighting Service Bureau has a simple system in its demonstration shop window whereby the insertion of an adaptor in place of a tungsten lamp brings a discharge lamp into service.

In conclusion, the author urges contractors to carry out experiments in order to obtain first-hand information on the application of discharge lamps to interior lighting. The paper includes a diagram illustrating the greater efficiency of discharge lamps as compared with tungsten lamps and a table showing the performance of mercury and sodium lamps, including the fluorescent type.



Mr. P. J. Robinson, city electrical engineer of Liverpool, has sent us these pictures of a display arranged in the windows of the Corporation electricity showrooms. The contrast between modern electrical setting and the dismal atmosphere of the past is very striking.

Industrial Air-conditioning

By J. Sharpley Jones, M.A.

The author, who is a member of the engineering staff of the Carrier Engineering Co., Ltd.

SINCE in most factories the temperature is not allowed to fall below 60 deg. F. in winter, on account of the comfort of the employés, and does not often exceed 90 deg. F. during summer weather, the range of temperature which can affect materials is considerably limited and effects of temperature on manufacturing processes are considerably less than might have been anticipated. Of course, materials expand with increasing temperature, but the amount of expansion within the limits given is, in general, negligible. In a few instances the material being handled changes its state within this range and the temperature is thus of vital importance. A particular example of this is in the chocolate industry, since chocolate melts at a temperature of 90 deg. F. and is too soft to work satisfactorily at more than 70 deg. F.

The influence of atmospheric humidity on manufacturing processes, however, is of very much greater importance; in fact, the principal advantage of air conditioning in manufacturing processes is due to the favourable physical state to which so many materials can be brought by suitable control of the humidity in the atmosphere.

Moisture in Materials

There are six common states in which water may be associated with normally solid substances:—

(1) Water adhering to the surfaces of a solid, such as a sheet of glass, wherein the areas of the solid-water and water-air surfaces of contact are of the same order of magnitude.

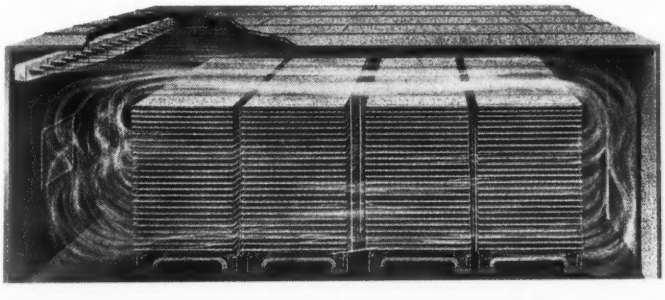
(2) Water occupying and permeating the pores or interstices of a solid, as occurs in a paste. This state differs from the first one in that the area of contact between the solid and the water is very much greater than the area of contact between the water and the air, and the water may be regarded as filling channels of capillary size between the particles of solid. Such a plastic mixture possesses a certain degree of rigidity which is not wholly due to the solid particles, since the mass contracts on drying.

(3) Water containing solids in suspension, such as in a slurry. The proportion of water is greater and this results in an absence of rigidity, the mixture behaving as a fluid.

(4) Water containing solids in solution, such as dissolved salts or colloidal substances.

(5) Water of crystallisation contained in solid crystallised substances.

(6) Water in hygroscopic substances, this term being limited to those complex materials of vegetable or animal origin having a cellular structure, such as timber and tobacco, wherein the cells contain complicated aqueous solutions. A hygroscopic substance in this limited sense therefore consists mainly of a large number of small quantities of solution, each enclosed within a cell wall, and differs from the solutions mentioned under (4) largely because in that case the solution is in bulk.



Ejector system dryer for treating material under uniform temperature and humidity conditions

In the case of surface water and of slurries the boundary surface of water to air is sensibly plane, so that the vapour pressure of the water will be the maximum vapour pressure of the pure water over a plane surface at the same temperature. Hence, if the vapour pressure of pure water in the atmosphere is less than this equilibrium value, evaporation will take place. Such water may be conveniently described as free water.

In the case of a paste, the water-air surfaces are not plane but are, in general, curved, the curvatures depending on the amount of water present and on the size and irregularities of the solid particles forming the surface layer. Hence, surface tension will play an important part during the drying of such materials, both in lowering the rate of surface evaporation and in producing shrinkage.

At any given temperature a solution is in equilibrium with water vapour at a lower pressure than pure water is, and this equilibrium pressure decreases as the concentration of the solute increases. To a first approximation the vapour pressure of a solution of fixed concentration is a definite fraction of the vapour pressure of pure water at the same temperature, irrespective of the actual value of the temperature. In other words, a solution of given concentration is in equilibrium with air of fixed relative humidity at all temperatures.

To concentrate such a solution by evaporation the relative humidity of the air in contact with it must be less than the equilibrium value. In the opposite way, if the solution is to be diluted by absorption of water vapour from the atmosphere, the relative humidity of the air must be above the equilibrium value.

Hygroscopic substances are in equilibrium with water vapour in much the same way as solutions, in that, to a first approximation, the equilibrium relative humidity at any given water content (or regain) is nearly independent of the temperature, so that the process of drying or moistening hygroscopic substances as defined in (6) by means of air will resemble the concentration or dilution of solutions. Actually, however, as a result of their cellular structure, the water content (or regain) of such a substance does depend slightly on the temperature as well as on the relative humidity of the air and, further, may vary slightly according to whether the equilibrium is reached by absorption or by desorption of water.

In the above the word "regain" has been used as synonymous with water content, whereas strictly it should be defined as the amount of water per 100 parts of dry material. Further, "regain" is used to imply that hygroscopic moisture only is present.

Broadly then, the equilibrium regain for any hygroscopic substance depends on the relative humidity of the air to which it has been exposed for sufficient time and the regain can be increased or decreased by exposing the material to air of higher or lower relative humidity.

Since the physical properties of hygroscopic materials depend so largely on their moisture content, it is obvious that such materials may be maintained in the most favourable physical condition to facilitate manufacturing processes by exposing them to air at a suitable temperature and relative humidity. Generally, the required physical condition can be ensured by holding the relative humidity of the atmosphere at a desired value, the actual temperature being of secondary importance except in cases where the material is liable to soften, with excessive temperature. Consequently, if the dry bulb temperature does not fall below about 60 deg. F. it is nearly always possible to maintain a relative humidity and temperature favourable to both material and employés. On the other hand, summer processes which require high relative humidities, particularly those processes where much power is used, involve working under conditions which are definitely unfavourable to the health and efficiency of the employés.

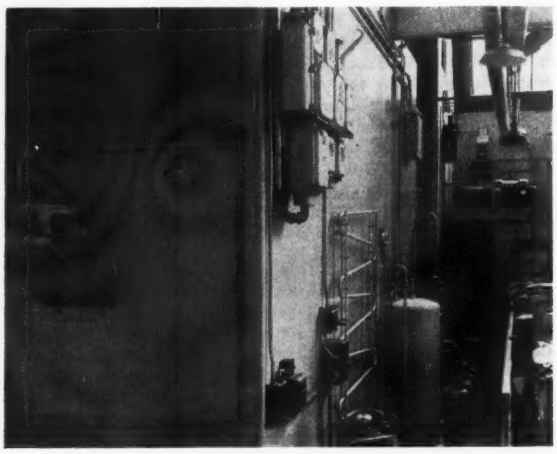
In addition to the provision of suitable atmospheric conditions for the processing of materials, industrial air conditioning also includes all kinds of drying and humidifying in cases where moisture changes are made to occur at prescribed rates. For example, removal of moisture of type (2) may be regulated with the object of controlling the shrinkage and rendering it uniform, thereby avoiding the cracking of articles during drying as a result of unequal shrinkage, this being one of the chief applications of air conditioning in the ceramic industry.

Air conditioning enables cotton to be spun in the same locality in which it is grown, instead of where the relative humidity is naturally high, such as in Lancashire, and as the processes are not subjected to the vagaries of the weather, they can be carried out at all times under identical conditions.

The microscope reveals cotton fibre as a flattened tube having a varying twist according to its water content. This natural twist enables the individual fibres to be spun into threads and the interlocking of the twisted fibres gives strength to the threads. The strength of the fibre and the amount of natural twist both vary with the humidity of the atmosphere to which they are exposed, both increasing with increasing humidity so that the provision of a humid atmosphere increases the strength of the fibres and therefore facilitates manufacturing operations. The twisting together of the various cotton fibres involves an enormous amount of friction and unless the fibres are in a sufficiently humid atmosphere generation of static electricity leads to difficulty in spinning.

In the weaving of cotton it is found that a relative humidity

of between 75 and 80 per cent. is most favourable. Since the amount of power dissipated within the shed is very high, the holding of this humidity during summer weather may involve an internal temperature of over 80 deg. F., with the result that the conditions are not comfortable. This difficulty could be avoided if the industry could afford refrigeration so as to



Air-conditioning chamber, fan and pump motors of printing works air-conditioning plant [*Elec. Rev. photo.*

enable the required relative humidities to be held at lower dry bulb temperatures.

Accurate Printing

In air conditioning for the printing industry the principal problem is to control the size of the sheets of paper so that successive printings may register accurately. This is accomplished by ensuring that the paper is in equilibrium with air at a fixed relative humidity and consequently has a fixed size. The actual relative humidity maintained in a printing shop is usually about 65 per cent., and is determined by the fact that this is the lowest relative humidity at which rapid printing can be carried out without static electricity causing the sheets of paper to tend to stick together.

In order that the stacks of paper waiting to be fed to the printing machine should remain flat and not crinkle at the edges, the paper should arrive from the paper manufacturer with a suitable moisture content, since if this is not the case the edges of the paper will either absorb or give up moisture to the atmosphere of the printing shop and thereby increase or decrease in size and crinkle at the edges.

The temperature of the hand dipping room in a chocolate factory must be kept below 70 deg. F. in order to prevent the chocolate from softening, while the relative humidity has to be kept down to an average of about 65 per cent. in order to prevent the formation of a whitish deposit known as "bloom" on the surface of the chocolate.

Drying Ceramic Ware

Ceramic articles are cast from a liquid mixture known as "slip," using plaster of Paris moulds. When sufficient water has been absorbed by the plaster of Paris to render the articles strong enough to retain their shape, the moulds may be removed and it is then necessary to dry out as much of the remaining water in the material as possible before firing can take place.

This drying out process is accompanied by considerable shrinkage, and in order that the thick and thin parts may shrink equally, the removal of the moisture must occur slowly and uniformly. To this end the articles should be placed in a dryer in which a very uniform circulation of air takes place, the relative humidity of the air being adjusted so that drying occurs mainly by the slow drawing of the water from the interior of the articles to the surface, rather than by the rapid drying of the surface, which leads to skin formation and other troubles. In this compartment type of dryer uniform distribution of the air is probably of more importance than in the other examples quoted, although naturally even in these cases uniformity of conditions throughout the shops is most desirable.

Women in the Modern World

E.A.W. Conference at Glasgow

A CONFERENCE organised by the Electrical Association for Women opened at the Empire Exhibition, Glasgow, on Monday last. Prior to the opening the delegates, numbering about 500, were entertained at a reception by the president and Council of the Institution of Engineers and Shipbuilders in Scotland at the Institute, Elmbank Crescent, Glasgow. Mr. A. C. Gardner, president, received the guests, and among those present were the Dowager Lady Swaythling, president, and Miss Caroline Haslett, C.B.E., director. Mrs. McColl, chairman of the Glasgow and district branch, replied to Mr. Gardner's welcome.

At the opening session Lady Swaythling read a message from Her Majesty the Queen conveying her good wishes for the success of the gathering. The papers were delivered under two headings, "The New Way of Living" and "Women's Work in the Modern World." Bailie Mrs. Jean Roberts, convener of Glasgow Corporation Electricity Committee, presided at the opening session.

Speaking on electricity, Mrs. Roberts complained of the high price of labour-saving devices. There were far too many people, she said, making such things as fires, cookers, and washing machines. She wanted to know if there were no means whereby manufacturers could get together and specialise in one or two appliances. "I do not wish to stultify new inventions," she proceeded, "but the present chaotic condition of every manufacturer making every gadget must cease. This condition results in too much door-to-door canvassing and too high selling cost. It is only too true that it costs more to sell an electrical appliance than to manufacture it."

Mrs. Roberts said she had resisted all attempts to increase the domestic tariff in Glasgow, in spite of the increased cost of such commodities as coal and cable. She told the delegates that Glasgow Corporation had the cheapest rates for domestic electricity in Great Britain.

Following papers on education by Dr. Frances Melville, O.B.E., and housing by Mrs. Helen B. Shaw, M.B.E., Dr. E. Sloan Chesser dealt with the question of public health, and paid a tribute to electricity as an eliminator of dirt and drudgery. Referring to the benefits of electro-therapeutics, she said that no hospital was up to date which did not possess a well-equipped electrical department, capable of giving X-ray and ultra-violet-ray treatment.

The field of electro-therapeutics was wide and not yet explored. She believed that the next fifty years would see the replacement of drugs by dietetics and Nature's measures, air, light and electricity. Electricity more than anything else would in the future contribute to racial health and racial happiness.

A vote of thanks to the speakers was moved by Miss M. G. Gowan, O.B.E., president of the Edinburgh branch.

At the Tuesday session Miss K. F. Boyd, in the course of a paper on "Agriculture" described the Craibstone School of Rural Domestic Economy of which she is principal, and stressed the necessity of taking electricity to the country districts. She spoke also of electrical development in Scotland, making particular reference to the Dumfries scheme.

Mrs. Edith Burnet Hughes read a paper on architecture, and mentioned how electricity had facilitated decentralisation of industry in Sweden and prevented overcrowding in towns. She suggested that the greater availability of electricity in Scotland and England gave scope for an inquiry into the matter and a national planning scheme.

The views of a woman engineer upon her profession were contained in a paper by Miss Victoria Drummond, and Miss Margaret Greig, demonstrator at the Carron Works, dealt with the qualifications and training necessary for her work. She went on to extol the benefits of electric cooking, and referred to the E.A.W.'s training schemes. "Domestic Science and Dietetics" was the subject of a paper by Mrs. E. L. Waldie, and this was followed by an interesting review of domestic electrical development in the Dominions by Mrs. O. K. S. Laugharne, who compared Canadian conditions with those prevailing in this country.

A vote of thanks was moved by Miss Mary Mackirdy.

Rubber Conference Report

The proceedings of the Rubber Technology Conference, which was held in London in May and was attended by nearly 500 representatives of eighty-nine organisations in sixteen countries, are to be published in one volume of over 1,000 quarto pages, including 103 technical papers. The price will be £1 11s. 6d. up to July 1st, 1938, after which it will be two guineas. Application should be made to the Institution of the Rubber Industry, 12, Whitehall, London, S.W.1.

Compulsion for Contractors

By Alan Kirk, A.M.I.E.E.

The case for registration and enforcement of rules

[*Elliott & Fry*

Mr. Kirk is a past chairman of the A.S.E.E. and represents that Association on the National Committee which he mentions in the article

IN considering whether there is reasonable justification for the introduction of compulsory measures in the electrical installation industry, the following questions have to be answered:—Will such measures benefit the user, the supply undertaking, the electrical contractor, the operative and the electrical industry generally? Will the cost of electrical installations be thereby increased?

To answer these queries it is necessary to preserve a proper sense of proportion relative to the adequate safety of the user and the welfare of the electrical industry as a whole. The paramount factor must be the safeguarding of the user, thereby obtaining and retaining the complete confidence of womenfolk in the use of electricity for all domestic purposes and consequently increasing the need for the services of those engaged in the electrical industry. Every accident that occurs, even of a minor nature, lessens the confidence of the user, and consequently has a detrimental effect upon every branch of the electrical industry.

It is a remarkable fact that the responsible bodies representing the employers and the employés of the electrical installation industry—being those directly concerned—are wholeheartedly in favour of such compulsory measures, and when it is further ascertained that the rank and file of such bodies are equally in favour one may be forgiven for thinking that such evidence should be sufficiently convincing to the other sections of the electrical industry.

The author deals with a matter that has been discussed for many years but has only recently been seriously taken in hand. He claims that all reputable employers and workers in the installation business are in favour of compulsory measures

Unfortunately, such lines of thought are not yet acceptable to all other sections, and it therefore becomes necessary to advance further facts and reasoning in an attempt to clear the vision of those other parties who, although outside the actual scope of installation work, are indirectly concerned, and whose goodwill is essential to the introduction and furthering of a scheme for the statutory registration of the employers and workers engaged upon electrical installation work.

To enable one to fully appreciate and thereby obtain a clear view of present-day practice in electrical installation contracting work it is essential that the following four irrefutable facts should be examined with the greatest attention:—

1. There is nothing to ensure that either the electrical contractor or the actual operative shall possess any electrical knowledge before embarking on electrical installation work.
2. There is nothing to prevent the unrestricted sale of electrical apparatus and material that is unsafe and a danger to the user.
3. There is no standard of work enforceable by statutory regulations to cover all classes of electrical installations.
4. There is no guarantee that the user is safeguarded when legitimately operating the completed installation.

Thus it will be seen that any member of the public wishing to enjoy the benefits of electricity in the home has, of necessity, to engage in a gamble as to whether the electrical installation when completed will be free from danger to him.

Protecting the Public

It is a trite but true saying that "you only get what you pay for," never more, sometimes less. It is also a trait of the human character that makes most people anxious to obtain the amenities of life for the least possible expenditure, and if in ignorance of the hidden danger of shoddy electrical work they assume that all contractors and operatives engaged in the electrical contracting industry are competent and skilled, and therefore proper persons to be entrusted with the work, then surely they are deserving of our utmost consideration and help when trouble arises due to defective workmanship and faulty materials.

It is undoubtedly the bounden duty of every member of the electrical profession and industry to take any and every possible step to ensure that the uninstructed user shall be provided with a safe and trouble-free electrical installation at a reasonable cost in which full value is given for the money expended. Electricity is the world's greatest blessing when properly prescribed and applied, but may well be a menace in the hands of ignorant and unscrupulous persons.

The reputable members of the installation branch of the electrical industry are controlled and governed by their respective associations and union, these being the Electrical Contractors' Association, the Electrical Contractors' Association of Scotland, the National Register of Electrical Installation Contractors, the Association of Supervising Electrical Engineers, and the Electrical Trades Union; but outside the influence of these bodies are great numbers of irresponsible so-called electrical contractors and operatives entirely uncontrolled, many of whom are a standing menace to the user and the electrical industry as a whole. The total number of controlled employers and employés is greatly exceeded by the number of irresponsible persons who contract to carry out electrical installation work.

The reputable contractors and operatives have to work to definite minimum standards of safety or risk the loss of their enrolment, but those outside such influences can, and do, carry out work that is unsafe to the user.

Since the National Register of Electrical Installation Contractors was founded the total number of applicants to the end of 1937 was 3,467, of whom only 1,719 are now on the Register; of the remainder 1,377 are at large to work their will upon the unsuspecting and unprotected public. Everybody with a knowledge of the electrical contracting industry will give their meed of praise to the founders of the National Register and a ready acknowledgment of the untiring efforts made by the Register to stem the tide of shoddy and unsafe work, but the available evidence shows that their Canute-like role is foredoomed.

Compulsory registration for contractors and their operatives is not a new proposition; one can go back thirty years and find evidence of attempts made to further this desirable proposal, efforts made by the Electrical Contractors' Association, efforts made by the Electrical Trades Union, all to end in failure due in great part to the lack of co-ordination between the different sections of the electrical industry.

Views of the E.C.A.

That this was is indicated by the appeal made to members of the Electrical Contractors' Association as recently as February last, in the Association's official journal:—

> We speak strongly in this matter because it is only too apparent that many of the difficulties experienced by the electrical installation trade are the direct outcome of misguided individualism. Time and again we see the futile "I" coming into a picture which is wholly collective.
>
> Electrical contractors are no more—and no less—than members of a section of a national industry, and it is supremely important that this simple fact, and all that it entails, should be constantly borne in mind. Relations with supply undertakings, relations with manufacturers, relations with labour, are all national matters in which the first person singular is a thing of the past. As an inevitable consequence, two main reflections emerge—we can move more forward as an important section of a national industry, or we can maintain our individualism and crash.
>
> We might stop at this point. We might leave the rest to the imagination of all concerned. Indeed, it would be the easier thing to do: but the associated ideas, the obvious consequences of this central proposition, are far too serious to be left in the air. It is not enough, for example, simply to think before we speak or write—as one section of a great industry, the need is to think collectively, to think nationally, and not to commence to think until we feel ourselves in reasonable possession of the national facts of the case.

Although this exhortation was penned for the members of the E.C.A., it can and should be read as applying individually and collectively to every branch and section of the electrical profession and industry.

In April, 1936, the Executive Council of the Association of Supervising Electrical Engineers, having in mind the chaotic state of the electrical installation industry, appointed a special committee to examine the general question of compulsory wiring regulations and registration in relation to the electrical installation industry in this country, and to prepare a paper on this subject.

After carefully examining and sifting the mass of evidence

collected regarding the present-day methods of the electrical installation industry in this country, the Committee also made exhaustive inquiries regarding the methods adopted and the results obtained in sixteen of the British Dominions and Colonies in which compulsory wiring regulations, registration and licensing had been successfully enforced.

The A.S.E.E. Committee's Proposals

The Committee came to the unanimous decision that a *prima facie* case had been established for the introduction of compulsory measures to govern and control the carrying out of electrical installation work in this country. The problem which had to be faced was, in what manner and by what means, this further control should be exercised, thereby ensuring the safety of the user of electricity without detriment to the prosperity of the electrical industry generally. The ultimate findings of the Committee may be summarised as follows :

Statutory power should be given to the Electricity Commissioners to establish a Board, which should fully represent all interested parties. This Board should be given powers to act as follows :—

(a) To register and to issue licences to approved electrical installation contractors, and to operatives and others engaged on installation work.

(b) To provide for inspectors and to control the activities of these inspectors whose function would be to ensure that electrical installation work conformed to a given standard and to the regulations.

(c) To issue regulations containing, *inter alia*, the following provisions :—

(i) That no person should carry out electrical installation work unless registered and licensed.

(ii) That the present regulations for securing the safety of the public should be revised, and strictly enforced.

(iii) That a scheme should be established to prevent electrical materials being marketed or used unless they conformed to approved standards.

(iv) The creation of such standards if not yet existent.

These proposals have been expounded, at two meetings in London and at eleven provincial centres throughout England, to audiences representative of all sections of the electrical industry, and have generally met with enthusiastic approval, the exceptions have mainly taken the form of non-constructive statements based upon incomplete knowledge.

It is now a matter of common knowledge that a National Committee on Statutory Wiring Regulations and Registration has been established with representatives from eleven of the leading electrical organisations under the independent chairmanship of Mr. S. B. Donkin. This National Committee has already held two meetings in London and has decided, as a preliminary step, to notify the Minister of Transport of the intention of the Committee to submit an enabling clause with the suggestion that it should be inserted in the proposed Distribution Bill which the Government is to introduce.

The Committee also has under consideration a draft scheme of registration of electrical installation contractors and operatives which has been based upon the statutory methods already in operation in the British Dominions and Colonies.

A great deal has been said regarding the question of inspectors and compulsory wiring regulations. It may be mentioned that there are no serious difficulties to be overcome in making adequate monetary provision for the setting up and payment of an ample inspectorate, without financial assistance from public funds or increased cost to the consumer—the scheme can be made self supporting.

Ready-made Regulations

With regard to statutory regulations, these are already existent—the Electricity Supply Regulations, 1937, "For Securing the Safety of the Public and for Insuring a Proper and Sufficient Supply of Electrical Energy" made by the Electricity Commissioners in virtue of the powers conferred upon them by the Electricity (Supply) Acts, 1882 to 1936.

These Regulations embrace "the general conditions as to supply to consumers" as enumerated in Clause 27 (a). "The undertakers shall not be compelled to . . . give a supply of energy to any consumer unless they are reasonably satisfied in respect of the consumer's installation :

" (i) That all conductors (including flexible conductors) and apparatus (including portable apparatus) are sufficient in size and power for the purpose for which the supply is to be used and are constructed, installed and protected so as to prevent danger so far as is reasonably practicable. . ."

The intention of this clause is to give the user protection from danger so far as is reasonably practicable. It also gives the undertakers powers to ensure that all materials and workmanship are constructed, installed and protected so as to prevent danger to the user and his property.

But the undertakers maintain that this is not a mandatory clause because it does not compel an undertaker not to connect up even if the installation is unsafe or liable to become unsafe to the user. If such an interpretation is correct it means that the words employed in framing this clause are useless, and it is the duty of the Electricity Commissioners, as guardians of the users' safety, to take immediate steps to delete the words "be compelled to" in the first line of Clause 27 (a), and thereby give a true intent to this clause.

Finally, it is of the utmost importance that in all matters concerning electrical installation work, no matter what branch of the industry is concerned, the safety of the user must be the first consideration, as it is only upon this foundation that the electrical industry can build a safe and sure industrial structure—differences of opinion, petty quibbles and egoism must be swept away leaving in their place a united electrical industry determined to make electricity the world's greatest blessing to mankind in actual fact.

Induction Heating. By A. J. G. Smith

Some new applications

APART from the well known results which induction heating has given in metal melting, it has been successfully applied to the heating of tube and shell ends prior to forging, and also to the heating of the end section of large steel tubes for a subsequent swaging operation. Furnaces of this type have been installed recently at Frankford Arsenal in the United States in connection with the nosing of shrapnel shell bodies instead of gas-fired air-blast furnaces.

Fig. 1 shows a special focus one-turn coil developed by the Ajax Electrothermic Corporation, indicating the sharply defined heating zone at the end of a tube or shell heated to 1,200 deg. C. Fundamentally, this is the same type of focus inductor coil as that used in the "Tocco" process for surface hardening crankshaft bearings.

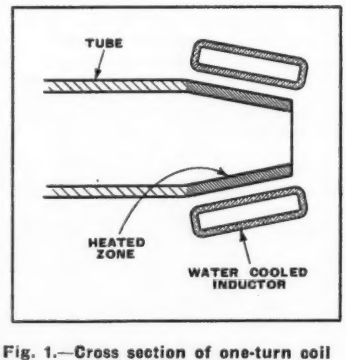


Fig. 1.—Cross section of one-turn coil showing heated zone

The main difference between the two applications is that whereas for surface hardening a large amount of power is concentrated for a few seconds so that the heating is confined entirely to the surface of the work, which is then rapidly quenched, when applied to heating the open end of a tube the power is not kept at such a high value, the heating time is extended to nearly one minute, and the walls of the tube are maintained at a uniform temperature of some 1,200 deg. C.

Fig. 2 shows the uniform heating of the end of a steel bar or billet when using a straight coil energised with high-frequency current. It is possible to heat uniformly the section of a 3 in. diameter billet to 1,200 deg. C. in 2 min., or a 7 in. square billet to the same temperature in 15 min. The heating of steel to a forging temperature by this method requires approximately 400 kWh per ton overall.

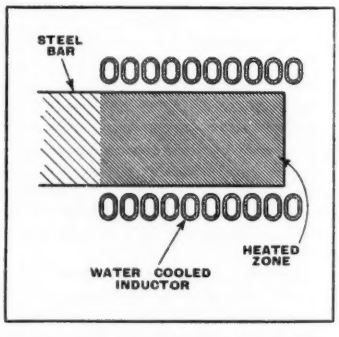
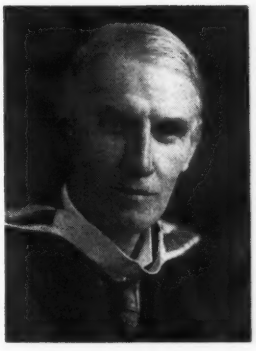


Fig. 2.—Cross section showing uniform heating of end of bar

In connection with this class of work, a graded temperature can be provided, which is very useful for forging operations. The open end of a shell or tube (inside the coil) is heated to about 1,090 deg. C., and gradually tapers back to 970 deg. C. at a distance of 6½ in. from the open end in the case of a 5 in. diameter tube. This is accomplished by altering the coil turns per inch or the position of the load in the coil. On the other hand, if an end section is required at uniform temperature throughout, with a sharply defined heating zone, this can be accomplished equally readily. The method also lends itself very well to automatic control.

Contractors and the Factory Act By F. Peake Sexton

New opportunities created



(Lafayette

Mr. F. Peake Sexton, A.R.C.S., A.M.I.E.E.

ELECTRICAL contractors should be keenly interested in the Factory Act, 1937, as it gives an opportunity to the most energetic members of the trade to obtain an *entrée* into many factories which might otherwise be closed to them. Such an opportunity to the right man will prove the greatest gift that a kind Government has given to the electrical industry. But naturally nothing is to be obtained without effort, and the man wishing to share in this new work must understand the various sections of the Act, and in many cases improve his knowledge of heating, ventilation, air conditioning, and such allied subjects. Contractors are in general complaining of lack of work, well here is the work to be done. The Home Office inspectors will doubtless make inspections and from time to time will issue orders under the Act.

Only a short time ago, a contractor remarked that such things as this were outside the scope of his work, but this is surely bad policy in a time of slackness. Somebody must do the work and whether it be the hot water man, the gas engineer, or the electrical contractor is certainly a matter of indifference to the works manager. The point is that in a regrettable number of cases the electrical contractor is too much of an installation hand and too little of a shopkeeper. He thus resigns, not without sighs, his legitimate trade to the general store or the ironmonger.

It would certainly be good policy for a progressive firm to make a study of the points raised in the Act, and then approach factories as an authority on the new requirements. A factory manager would probably welcome an approach by a technical man if he were an expert on the requirements. The word "requirements" is used in place of "regulations" as regulations are as yet unissued, and when they are issued the best chance will have been lost as much of the work will have been done. The sections of the Act that could be well dealt with by the electrical contractor are cited below.

The requirements of the new Factory Act which comes into operation on July 1st, are of particular interest to electrical contractors. In this article the principal provisions are reviewed with this aspect in mind

Section 3.

This section requires that in factories where most of the work is done sitting, the room shall be maintained at a temperature of not less than 60 deg. F. It further specifies that the heating agent shall not pass into the room any injurious or offensive fumes. This seems a strong point in favour of electric heating and the maintenance of a temperature of 60 deg. F. will entail large orders for electric heating plants. Another point is that a thermometer is required in every room. Why should not these thermometers be supplied by the electrical contractor?

The requirements under this section alone open a wide field to the really pushing man, who is willing to study the various systems of heating and be prepared with information as to the relative cost both of installation and maintenance of different plants. It means that the electrician taking advantage of this section must know as much about, say, gas as the gas engineer knows of electricity.

Section 4.

The requirements here are simply a circulation of air and an adequate ventilation; the rendering harmless of any dust or fumes produced in the work is specially mentioned. These are really old requirements and the various regulations as to ventilation are well known to ventilation engineers. Simple cases could be quite well dealt with by the electrical contractor, if he made a little study of the subject, and this would avoid serious mistakes. Most contractors know far too little of this matter and unless they make themselves at least acquainted with the general outline should not attempt to install fans.

The difference between circulation and ventilation should be most carefully considered. As an example of the former one can consider the large diameter ceiling fan often used in restaurants, and of the latter the portable fan when provided with suitably placed inlets. Ceiling or table fans neither cool nor purify the air, but produce an apparent cooling effect by increasing the evaporation from the pores of the human body. It should also be pointed out that ventilation does not mean draughts, which are generally disagreeable except in the hottest weather. An instructive handbook on ventilation is issued by H.M. Stationery Office under the title "Home Office Welfare Pamphlet No. 5," which is obtainable for a shilling.

Section 5.

This section calls for a general improvement in factory illumination, but no values are given in the Act. The unenterprising contractor will wait for the Home Office to issue regulations. But why not take the figures suggested in the E.L.M.A. tables for factory illumination, interview the works manager, show him the Act, demonstrate to him that production can be increased by better illumination and point out that there is also a lower accident rate in the properly illuminated works. The last contention can be supported by factory inspectors' reports.

The points dealt with above are from sub-section (1). Sub-section (3) states that no regulations will be issued that call for any particular system of illuminant. Sub-section (4) requires all glazed windows to be kept clean on both inner and outer surfaces, unless white-washed or shaded for the mitigation of heat or glare. It is not suggested that the contractor should maintain a window cleaning department, but it may be a bright idea. Besides the cleaning of windows there is the cleaning of globes and reflectors. In one case I actually increased the illumination on work benches by 80 per cent. by cleaning the semi-indirect bowls.

Section 12.

This section calls for the fencing of all flywheels and moving parts of all prime motors or movers. Sub-section (3) calls for similar attention to be paid to electric generators unless they are made safe in some effective manner.

Section 13.

This section deals with transmission machinery, which the electrical installation contractor generally considers to be outside his sphere, although he does not object to supplying a motor. There is no reason why he should not undertake the fixing of shafting, pulleys and belts, should the opportunity arise, yet in very many cases such work is turned down, with, in some instances, the loss of future orders for motors. The average electrician is not really familiar with factory requirements of motors so therefore the sub-sections will be considered as follows:—

(1) All and every part of the moving machinery must be securely fenced, whenever it is within reach of a person in the factory.

(2) Efficient means must be provided in every room to cut off the supply to the moving machinery in that room. This calls for the use of remote control stop buttons, and this section should be very carefully considered by the electrician concerned.

(3) A belt must not be allowed to hang on a revolving pulley or shaft when not in use. This should stop the dangerous practice of permitting idle belts to rest on revolving shafts. It should be appreciated that the danger here lies in a sudden development of friction, which would cause the belt to come into motion without warning.

(4) That suitable belt striking gear shall be installed and kept in order. Means are to be taken to prevent belts creeping from an idle to a moving pulley. Here the aim of the Act is to prevent the too common practice of belt changing or striking with the aid of a wood pole or an iron rod. The dangers of this need hardly be mentioned.

(5) Power is here given to the Secretary of State to suspend the sub-sections (2), (3) and (4) above mentioned.

Section 14.

The protection ordered under Section 13 is here extended to other machinery than prime movers, the requirements being essentially the same.

Section 17.

Although this section (Construction and Sale of New Machinery) appears to only concern the manufacturer of

machinery, it must be remembered that in law a claim would be made against the supplier in the event of there being any defect. Naturally the supplier could make a claim against the manufacturer, but such actions at law are best avoided and it might be maintained that the order for the plant did not specify that the machine was to comply with the Factory Act. It is therefore highly desirable that the contractor should study the requirements, and be in a position to see that the machinery ordered or supplied is in accordance with the Act. Unless this is done it would be wise not to deal with such machines, as may become expensive should a legal claim be involved.

Compliance with the B.S. Specifications must be assured, but the only points that can be dealt with here are the special requirements under this section. (*a*) Every set-screw, bolt or key on a revolving member shall be so sunk, encased or guarded as to prevent danger; (*b*) All spur and other toothed or friction gearing which does not require frequent adjustment while in motion shall be completely encased unless so situated as to be as safe as if it was so encased. The whole of this section can be summed up by saying that operators of machines shall be efficiently protected from projections on revolving or moving parts.

Section 52.

This section relates to the condition in "humid factories." An explanation of this term together with many others is given in Section 152; "humid factory" means a factory in which atmospheric humidity is artificially produced by steaming or other means in connection with any textile process.

Once again the average electrical contractor will disclaim responsibility, but why? Somebody must do the work and as every day electrical air conditioning is becoming more and more common, the electrical engineer should put himself in a position to deal with this work as required under the Act. This section makes the use of hygrometers compulsory which means that a considerable number must be sold by any firm who deals with this problem, and it may lead to quite a considerable amount of machinery.

It is quite true that the contractor concerned will have to master such instruments as wet and dry bulb thermometers, and be able to talk wisely on "vapour pressure," "relative humidity," "dew point," etc., but he will be none the worse for this extra study.

Following these introductory remarks the sub-sections that concern the contractor are as follows:—

(2a) In each room concerned two hygrometers of an approved type shall be fixed. (i) One to be fixed centrally, and one at the side, as may be agreed with the inspector, and both to be clearly visible to the employés. (ii) A copy of the table of humidity set out in the Act or such other approved table to be hung near each hygrometer. (iii) These instruments are to be in general read twice daily at approved times and a record made of the readings. (iv) The records are to be kept and hung near the hygrometers and are to be filed for reference.

The remaining sub-sections concern the management and the factory engineer who is responsible for the humidity.

Section 107.

This section makes a considerable part of the Act apply to building operations of all kinds except to work that is part of a railway or tramway. All the requirements as to machinery are to apply, but regulations as to temperature and humidity are not applicable as might reasonably be imagined, the work often being in the open.

Sub-section (2) instructs the builders as to what notices shall be served, and to whom, at the commencement of the work. These notices need not be served if the work is to be finished within six weeks.

This section can generally be ignored by the electrical contractor as he will often be in the position of a sub-contractor and in that case they should be issued by the firm employing him. It is, however, useful to bear in mind the requirements

Section 152.

Use has already been made of this section, which is a general interpretation of the terms used in the Act. It makes a very useful set of definitions and being official should be consulted when using the Act. It has been said that:—"A definition defines what one means, when one says what one does not mean."

It is possible that without an explanation readers might resent some of the remarks made. Let me assure them that such remarks do not apply to readers of this article, but rather to those mysterious contractors and many of their young electricians who think that they can play an efficient part in a great industry without even reading a weekly technical journal.

Control Gear Manufacture

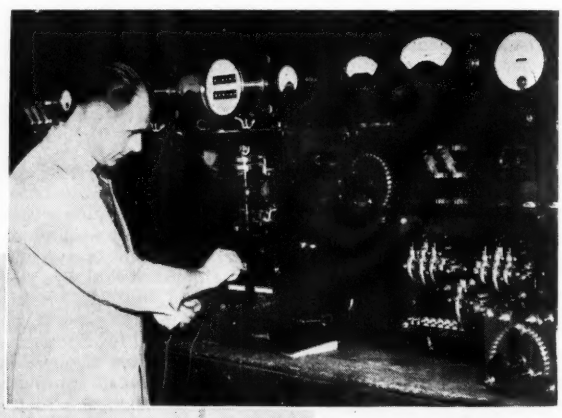
THOUGH the control gear made by William Geipel, Ltd., is well known throughout the industry, we were surprised during a recent visit to their factory at Bermondsey to discover what a large amount of work is done there in the way of special equipment, in particular, complete switchgear and lighting units for theatre stage use.

In these stage control units extensive use is made of the "Ribohm" type resistances, which comprise nickel-chrome strips formed into channel sections and mounted on interchangeable fireproof formers, and another type in which the resistance strip is wound on mica formers and enclosed in pressed steel cases. A feature of these resistances, of which large numbers are supplied unmounted for various purposes, is that the material is so thin that heat is readily dissipated.

One rather unusual board for projector and spotlight control just completed, is of the unit pedestal type arranged so that contactors will switch on various circuits as required by means of remote control. As on the battery charging boards also made, no wires are employed for connecting up the metal cased unit resistances, the design of which renders them unnecessary and thereby removes a likely source of failure.

Starting contactors for Diesel-engined vehicles have recently been occupying the attention of the company. Of extremely light and robust design, this apparatus is made in single- and double-pole types, and by reason of the novel guard cannot inadvertently become actuated under road vibration. The company anticipates a growing market for these contactors for electric vehicle control. All contactors manufactured have rolling and self-aligning contacts which prevent welding. Almost complete silence in operation is claimed for the a.c. contactors.

Other apparatus which the company now has under construction include's ship's steering indicator gear; combined starters and speed regulators, electrically and mechanically interlocked; reversing and change-over contactors; various types of contactor-operated safety gear to comply with the new Factory Act; and aerodrome equipment. Among the last-mentioned we noticed an obstruction light control unit with a particularly interesting feature. It is arranged to flash once a second, but should the electric motor slow down or stop from any cause, a mercury governor switch, normally kept open by centrifugal force, automatically closes and keeps the lights switched on.



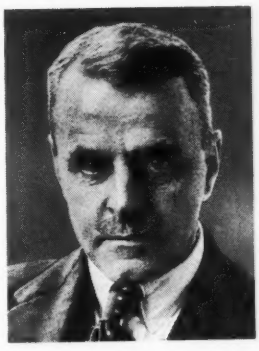
[*Elec. Rev. photos.*

Above: the test room at William Geipel's factory at Bermondsey showing an aerodrome obstruction light under test. Left: assembling starter face plates

Payment by the Hour

By H. R. Taunton

Casual labour in the contracting industry



[*Elec. Rev.* photo.

Mr. Taunton draws upon many years' experience in writing on contractors' problems

THE successful contractor, patting himself on the back, is apt to overlook the part in his success played by his men. One of his pats, however, is well deserved. He must have had the good sense to employ the sort of men to bring him success; in other words, men on whom he could count for the good workmanship which is the true foundation of his prosperity. Reliable men—sound, permanent jobs—a solid reputation—increasing orders, turnover, bank balance—success: that is the way it goes. A contractor may have energy, enterprise, shrewdness and honesty, and all the other qualities necessary to his difficult calling, but in the end he must rely on his outdoor staff, his workmen, to carry out his ideas and maintain his standards. His financial fate is in their hands. If they let him down consistently he *is* down, and out.

He who finds the argument unpalatable may say it is answered by adequate supervision. There is no profit in supervision; it is at best a standing charge. Necessary, of course—the most reliable of men may slip—but it cannot counteract fundamental incompetence. It discloses a bit of bad work; and then the contractor has to choose between his reputation and his pocket. He can have it put right at a certain loss, or he can let it slide and pay for it in the end. The impossible ideal would be a staff of men who needed no supervision other than that of their foremen; and the nearer the contractor can get to that, by choosing good men to start with and then keeping them, the larger may be his ultimate profits.

Electricians, although highly skilled men, often lead a precarious existence by reason of the accepted methods of employment in the contracting industry. The author asks why they should not be put on to a more permanent basis and given the amenities enjoyed by other workers

The importance of the wireman's part conceded, the question arises: Is he adequately remunerated for it? In comparison with his employer, does he get a fair share of what the public is willing to pay for the amenities his trade supplies? Alternatively and contrariwise, could he give more for what he now gets, or would he, perhaps, give more under other and perhaps more encouraging conditions?

His present remuneration boils down to a fixed hourly rate of pay. So far as the actual figure goes, there can be little argument about it. It compares well with that of other workers in the building trade; and, having regard to the cost of living, it probably represents a fair equilibrium between the value of his work and what the public can afford to pay for it. As a basis, fluctuating slightly from time to time, it is difficult to see how it can be effectively altered.

Lack of Continuity

A fixed weekly wage implies continuity of employment, which, as things are, cannot be guaranteed to the majority. Piece rates are out of the question in a trade where no two jobs are alike. Bonuses, where tried, have invariably proved a failure; and any scheme of profit sharing, though it may be a development of a distant future, must always be supplementary to running earnings. In the electrical contracting trade, then, as in similar trades, payment by the hour seems to be imposed on it by its essential conditions. But it has disadvantages, some of them obvious to the employer, and some, affecting the employé, less appreciable but no less serious.

The one big drawback of the hourly rate is that it offers no inducement to the workman to make his output any more than the minimum which keeps him in line with his fellows. If he can avoid being sacked for slacking by just doing in an hour a job of work which any other of a dozen men wouldn't do in less time, why should he put himself to the pains of doing it in three-quarters of an hour? It might put another fivepence or sixpence in the boss's pocket; but what would he get out of it, except a shorter job, less money, and a certain unpopularity. He is not to be blamed. There is nothing malicious or dishonest in his attitude. He is simply working to an agreed tempo, which he takes without needless thought as the normal of his trade.

Faced with the solid difficulty that the harder a man works the less money he earns for the same amount of work, employers as a whole seem to have abandoned any attempt at a solution of it, and to have resigned themselves to an increasingly slower tempo, palliating it dangerously by making the public pay greater and greater costs. That is a vicious process which cannot go on indefinitely. Let output be further restricted, whether by deliberate policy or the unthinking spirit of a languorous age, and a time must come when the milch cow, the public, will jib at anything but bare electrical necessities; and it is the men who will suffer the consequences in increasing unemployment.

They cannot, if they give it candid thought, say that greater output is not easily to be got, or is incompatible with comfortable and healthy working conditions. The older men among them could easily refute them; and any contractor of long experience could support them, not merely with the exaggerated memories of age, but with hard facts and figures from their books. I can remember myself, in Dublin in the summer of 1902, actually seeing a wireman sweat at his job. It was the last time I ever observed the phenomenon—and, to be sure, there were in his case reasons for the aberration.

What the men can say, and fairly, is that, whatever vague benefits increased output might bring them by-and-by could be no compensation for the definite loss of total earnings and greater unemployment in the present. In the face of that hard fact any reasoned appeal to them to consider the future interests of the industry would be futile. All they would see in it, excusably, would be quick profit for the employer, and for themselves the exchange of the bone of a fairly easily earned pay envelope for the shadow of something over the horizon.

The truth is that however prosperous the industry—though heaven knows it isn't always and uniformly prosperous!—all the men can hope to get out of it is their fixed hourly wage; and it is only natural they should make the most of it, fighting always for its permanence and enhancement, without fancy trimmings, and spinning it out as far as conscience and common-sense will let them. Is it, to hark back to the earlier question, adequate remuneration? Yes, relatively, *if*—if they could count on it for the full 47-hour week, throughout the seasons and year after year; if they had some of the amenities commonplace to workers in other industries: holidays with pay, insurance and saving schemes, benevolent funds and the like; if, at the end, they could rely on something more than their impossible savings or State assistance in their old age.

All these benefits and securities, however, are barred to them as a class, not necessarily and wholly by the conditions of the trade, but certainly and largely by the accepted basis of pay. Because he pays them by the hour their employer naturally dismisses them the moment he can do without them. That, from the men's side, is the most direct drawback of the hourly-rate system. An unlucky man may spend half the year on the dole, so that in effect his average earnings per hour may be only a fraction of the current figure. With a, perhaps impossible, weekly wage system intermittent unemployment would be certainly less, if only because the employer would not have the same incentive to prompt dismissals.

Similarly, any co-operative scheme for the benefit of his men which an employer might like to foster is made difficult or impossible by the fact that most of them, through no fault of their own, are not with him long enough to qualify for anything of the sort; or, to put it in another way, one man may work for half a dozen firms in the course of a year.

Holidays With Pay

Take the topical subject of holidays with pay. It has always seemed to me a hardship that an electrician, who surely needs an annual rest and change as much as, say, a typist, should, if he takes it, have to pay doubly for it by losing his wages while he is away. At the same time, it will puzzle the Government in its proposed compulsory legislation to cover his case. A good, steady workman, he may find no difficulty in keeping in practically continuous employment throughout the year, but with some three or four firms, three or four months with each. Which of them can be reasonably asked to pay for his holiday?

There is only one way of ameliorating these adverse conditions, and that is by better organisation by the employers of the fund of labour available to them. Too many of them draw on it lightheartedly when they want a man for a few weeks' job, and as lightheartedly dismiss him again when it is

Transformer Protection.

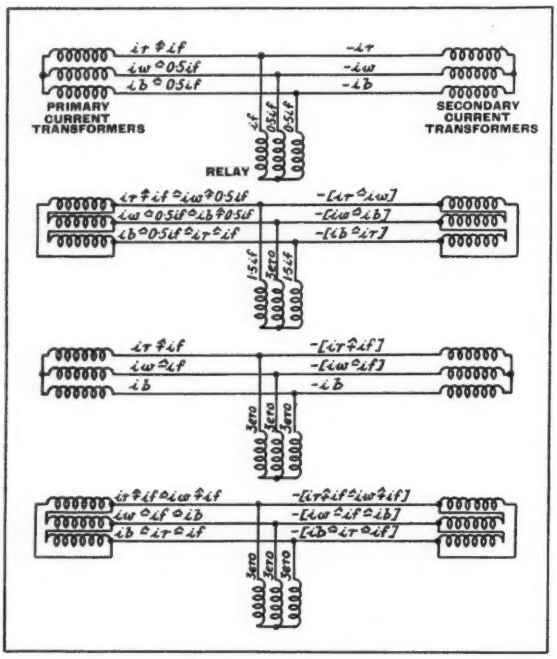
By C. L. de Beer, A.M.I.E.E.

In certain cases precautions are necessary to ensure stability of operation with star-star connections for power supplies, and this matter is dealt with by the author in the following article

PROTECTION of transformers by the Merz-Price system is not universally applicable and in certain cases entails precautions to ensure stability. Three groups of star-star power transformers are here considered. Primary and secondary current transformers are assumed to be of the correct ratios and correctly phased and errors due to the inability of the current transformers to reproduce entirely the primary and secondary conditions or due to the presence of magnetising current in the primary have been neglected.

When using three single-phase units and three-phase shell units with an unearthed system the only faults that show up as such are internal ones between turns and external ones between lines. Either an internal or external earth fault has to develop into one of the above before it becomes apparent.

Dealing first with internal faults between turns, let I_R, I_W

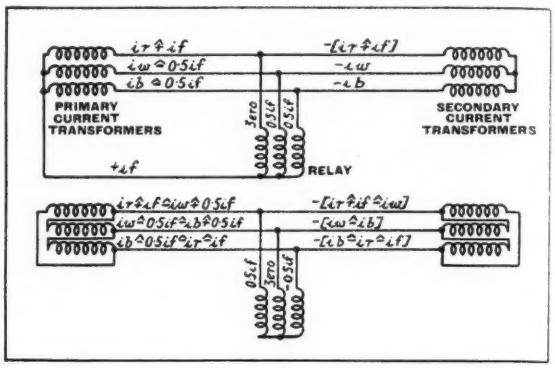


Three single-phase units or three-phase shell unit (unearthed neutral). Top to bottom: Fault between turns, current transformer in star; fault between turns, current transformer in delta; fault between external lines, current transformers in star; fault between lines, current transformer in delta

and I_B be the primary line current corresponding to I_r, I_w and I_b secondary line currents, and I_f the secondary fault current and I_F the corresponding primary current. Let i_r, i_w, i_b and i_f be the currents in the protective circuit. In the case under consideration, I_F will be the fault current in the primary faulty phase and $-I_F/2$ the fault current in the healthy phases. This holds good for a fault in either the primary or secondary winding, as the fault current may be considered to be passing through a closed isolated winding without affecting the main considerations. The total primary currents become $(I_R \hat{+} I_F)$, $(I_W \hat{-} I_F/2)$ and $(I_B \hat{-} I_F/2)$,* and the currents in the corresponding current transformers are similar.

Where these current transformers are connected in star, a current of i_f passes through one of the relay coils while $i_f/2$ passes through the other two. Where the current transformers are connected in delta, $3i_f/2$ passes through two of the relay coils and zero through the third.

In the event of an external line fault two phases are affected



Three single-phase units or three-phase shell unit (earthed neutral). Line to earth fault, current transformers in star (top) and delta

and the fault current in them will be I_F and $-I_F$, I_f and $-I_f$. The total line currents become $(I_R \hat{+} I_F)$, $(I_W \hat{-} I_F)$ and I_B; $(I_r \hat{+} I_f)$, $(I_w \hat{-} I_f)$ and I_b). With star-star or delta-delta current transformers zero current passes through the relay coils. Both arrangements are therefore stable under through fault conditions.

The earthing of either the primary or secondary neutral has no effect on the behaviour of the protective system under such fault conditions and, furthermore, an internal earth fault in either of the windings becomes identical with a short between turns which has already been examined. With the primary neutral earthed a secondary external earth fault does not become apparent until it has developed into a fault between lines. With the secondary neutral earthed a secondary external earth fault becomes immediately apparent. The secondary fault current I_f flows in the faulty phase only, while in the primary I_F passes through the faulty phase and $-I_F/2$ through the healthy. The total line currents become $(I_R \hat{+} I_F)$, $(I_W \hat{-} I_F/2)$ and $(I_B \hat{-} I_F/2)$ in the primary and $(I_r \hat{+} I_f)$ I_w and I_b in the secondary.

With either star- or delta-connected protective transformers $i_f/2$ passes through two of the relay coils and zero current through the third, so that both the arrangements are unstable on through earth faults.

Turning to three-phase core units the fundamental difference

*Symbols $\hat{+}$ and $\hat{-}$ denote that addition and subtraction must be done vectorially and not merely arithmetically.

Payment by the Hour *(Continued from preceding page)*

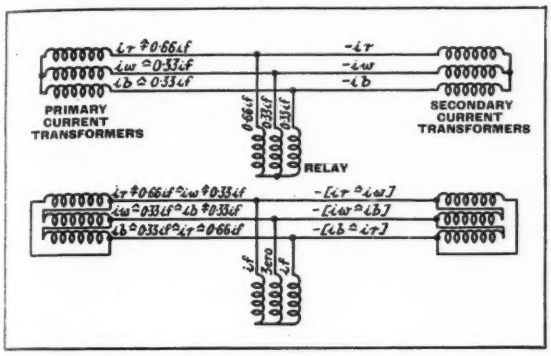
finished. It is the easy thing to do. There are plenty of skilled men available at an hour's notice. It saves worry and thinking to engage and sack men from day to day as they are wanted or not. It certainly saves the worry of thinking of the hardships the men suffer who are so easily "stood off."

"Standing off" is at times an unavoidable solution of the problem of fluctuating trade; but, as often as not, it simply means that a firm is too lacking in foresight, too casual and lazy-minded to make any effort to plan an even spread-over of its labour. Yet that can generally be done, though it may be sometimes with a slight sacrifice of cast-iron "efficiency." One job can, perhaps, be anticipated a little, another postponed, or a third used as a "stock" job from or to which men can be taken or sent as reasonable occasion requires. Such a system of flattening the labour curve, organised by individual firms, and extended and amplified by co-operation between local firms, would go far towards bettering the lot of the men, and perhaps make possible for them not merely security of employment but the other benefits now withheld from them by the casual methods which are characteristic of the electrical contracting industry.

This is no Utopian fancy. Some of the larger and more successful firms have long followed the policy of organising their labour requirements at a steady level. Their primary end was doubtless to keep in their own employment men of known quality; and it will be found that in such firms a large proportion of their outdoor staff has in effect permanent employment with them. A secondary result has been the gradual fostering of that spirit of loyalty to the firm which can only come from long association. It is unconscious, perhaps, inarticulate, intangible, but its value is incalculable. It more than rewards the employers for the trouble they have taken to link their men's interests with their own. In it, if the electrical contracting trade at large would take the same little trouble, lies the solution of the difficulties and disadvantages to both sides inherent in the present, and probably ineluctable, system of payment by the hour.

between these and either the three single-phase units or the shell-type unit is that the interaction of the phase fluxes in the core causes out of balance currents in the secondary winding to be distributed in the primary, *e.g.*, a 100 per cent. single-phase current in the red secondary is reflected in the primary as 66.6 per cent. red and 33.3 white and blue, whereas with the first group it is reflected as 100 per cent. red and 50 per cent. white and blue.

With an unearthed neutral an internal fault causes the total primary currents to become $(I_R \hat{+} .66 I_F)$, $(I_W \hat{=} .33 I_F)$ and $(I_B \hat{=} .33 I_F)$, but the secondary currents remain I_r, I_w and I_b. When the protective transformers are star-connected .66 i_f passes through one of the relay coils while .33 i_f passes through the other two. When the protective transformers are delta-

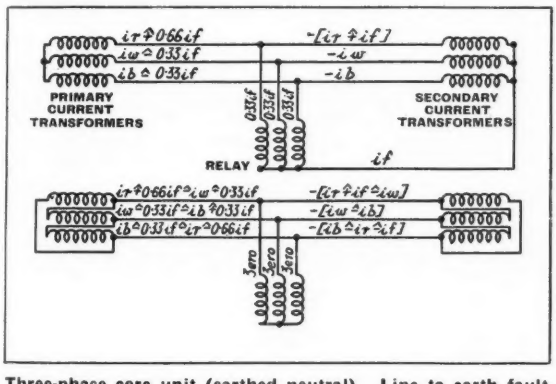


Three-phase core unit (unearthed neutral). Fault between turns, current transformers in star (top) and delta

connected i_f passes through two of the relay coils and zero current through the third.

An external line fault is accompanied by a current distribution in both the main transformer and the current transformers that is identical with that with three single-phase units and three-phase shell units, and the system is therefore stable under through fault conditions.

As in the case of three single-phase units or the three-phase shell units the earthing of either the primary or the secondary neutral of three-phase core transformers has no effect whatever on the protective system with internal or external line faults. Furthermore, the presence of an internal earth fault shows up in exactly the same way as has been described for an internal fault between turns.



Three-phase core unit (earthed neutral). Line to earth fault, current transformers in star (top) and delta

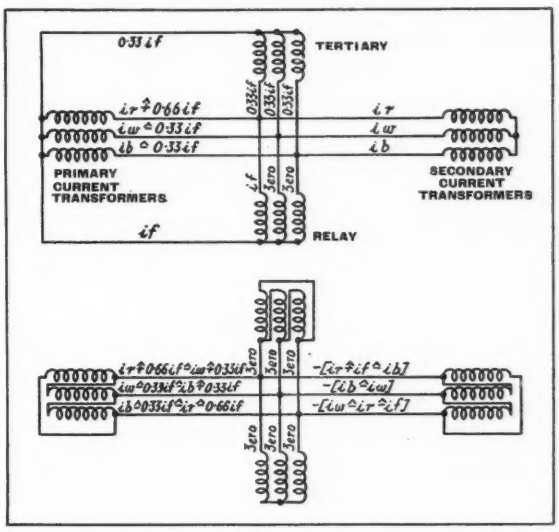
In an external earth fault on the red phase with the secondary earthed the value of the secondary currents become $(I_r \hat{+} I_f)I_w$ and I_b, while the primary currents are $(I_R \hat{+} .66 I_F)$ $(I_W \hat{=} .33 I_F)$ and $(I_B \hat{=} .33 I_F)$. With star-star protective transformers .33I_f passes through each of the three relay coils and the system is therefore unstable under through earth fault conditions. With delta-delta protective transformers zero current passes through the relay coils and the system is therefore stable under through earth faults.

The effect of the tertiary winding on a shell unit is the same as that of the magnetic core on the core type, *i.e.*, a single-phase secondary current is distributed in the ratio 66 per cent., 33 per cent., 33 per cent. in the primary phases. The reasoning and results obtained for three-phase core units can therefore be applied to this group and, furthermore, the effect of an internal fault between turns in the tertiary winding is similar to that of a fault between turns in either the primary or secondary windings. An alternative method of protecting this group is to provide a further set of protective transformers in the tertiary winding itself.

The presence of a 100 per cent. fault current in the red phase secondary causes a current of 33 per cent. to flow in the tertiary winding in addition to the primary fault current. Total currents, therefore, become $(I_R \hat{+} .66 I_F)$, $(I_W \hat{=} .33 I_F)$ and $(I_B \hat{=} .33 I_F)$ in the primary, .33 I_F in each of the tertiary phases and I_r, I_w and I_b in the secondary. When the groups of current transformers are star-connected, i_f passes through one relay coil and zero through the remaining two. When the groups are delta-connected the current distribution in the protective circuit is the same as for three-phase core-type units with unearthed neutral, *i.e.*, i_f passes through two of the coils and zero current through the third.

An external line fault has no effect whatever on the tertiary winding; the current distribution in both the main windings and the primary and secondary current transformers is, therefore, identical with that for the single-phase and shell arrangements, *i.e.*, with either star or delta connections zero current passes through the relay coils and the system is therefore stable under through fault conditions.

With an external earth fault on the secondary the current distribution becomes $(I_R \hat{+} .66 I_F)$, $(I_W \hat{=} .33 I_F)$ and $(I_B \hat{=} .33 I_F)$



Three-phase shell units with tertiary winding. Fault between turns, current transformers in star (top) and line to earth fault, current transformers in delta

The circulating current in the tertiary winding becomes .33I_F and the secondary current becomes $(I_r \hat{+} I_f)$, I_w and I_b. With star protective-transformer connections the current in the protective circuits is the same as for three-phase core-type units with earthed neutral. With either star or delta c.t.'s zero current passes through the relay coils and both systems are therefore stable under through fault conditions. It may be noticed that with the above arrangement it is possible to take a load from the tertiary winding without upsetting the balance of the protective system.

Summing up the foregoing we find: (a) On entirely unearthed systems either star-star or delta-delta protective transformers can be employed, but the latter are preferable as they energise two of the three relay coils at maximum value as against one with the former connection. (b) On systems with the secondary neutral earthed it is impossible adequately to protect single-phase groups or shell-type units and the core-type unit can be protected only by means of delta-delta connected current transformers. (c) In the special case of the shell-type unit with tertiary winding adequate protection is obtainable either by means of two sets of current transformers with delta connection or by three sets of transformers with either star or delta connection. In the latter case the delta connection is again preferable as with it two of the relay coils are energised at maximum value as against one with the star connection.

Copper Pipes

A new publication of the Copper Development Association includes in 111 pages, with the aid of 55 diagrams and 17 tables, most of the information on "Copper Pipe-line Services in Buildings" that is now only available in scattered form. Much of the matter is of a practical character intended for those engaged in the installation of water, heating and sanitation services, but there are also sections likely to be helpful to those responsible for their design and layout. A short chapter, including a table of dimensions, deals with copper electrical conduit, and data regarding jointing, bending and fitting are to be found elsewhere in the book, but air-conditioning and vacuum-cleaning installations, do not come within its scope. Copies will be supplied to those in responsible positions.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Reorganisation of Distribution

Much as I respect the views of Mr. H. M. Sayers on this subject I feel that there is another aspect of the question of reorganisation which he ignores. He seems to imply that the absence of rural supplies (in general) shows the need for reorganisation of distribution as outlined in the McGowan Report. Put simply, he favours the idea of eliminating roughly four hundred small undertakings in order to secure large-scale operations by some two hundred undertakings which would supposedly overcome the inefficiency attributable to small-scale working and reduce the expenditure attaching to individual working and administration.

This is the sort of argument, however, which cuts both ways. If only the farms were larger, if only more people lived in the country, if only people hibernated instead of each living in their widely separated cottages, what a tremendous gain to efficiency and economy would result. If the McGowan scheme could possibly produce one-half of the results which are wildly claimed for it in some quarters, it ought to be a practical proposition to produce a parallel scheme which would work similar wonders for the rural districts. Obviously, such a scheme would aim at compulsorily amalgamating about two hundred small, inefficient, uneconomic farms into a single large-scale unit; it would resort to some measure of town planning and group the workers' dwellings; it would see that agricultural labourers were paid wages which would enable them to enjoy the amenities of life—including electricity—which are open to their more fortunate brethren in urban districts.

The plain fact of the matter is that rural supplies are not an economic proposition in the majority of instances. The working of the Bedford and Norwich rural undertakings shows very plainly the sort of results to be expected, even in the best of circumstances and it is not every undertaking which enjoys the benefit of selected station prices in its cost sheet. Electricity supply is a business with commercial obligations, otherwise there must be nationalisation or State assistance. In this connection, it is interesting to reflect on the attitude of the farmers when asked to take up sugar-beet growing, some years ago. Their answer was to the effect that the crop was not a paying proposition and if for national reasons it was desirable that sugar-beet growing should be established, then the State should subsidise the loss. As is known, a considerable subsidy was the result.

Surely it is not the function of a supply authority to afford supplies in a rural area on an unprofitable basis and trust that the profits in other directions will be sufficient to subsidise the loss on working? The question is rather one of national politics than of undertaking policy. Unless supply authorities treat this question of rural supplies with the strictest caution they may ultimately find themselves in a position not amenable to normal business direction.

JAMES RATCLIFFE, *Engineer and Manager*,
Whitworth, Lancs, *June 20th*. U.D.C. Electricity Dept.

My original communication referred to the proceedings at Torquay. As regards the scheme of the smaller undertakings, mentioned in Mr. De Renzi's letter and your editorial comment; as I see it, the chief operative item of the scheme is the postponement of reorganisation for five years. The other things could have been done at any time during the last fifteen years under the provisions of the Acts of 1919 and 1922.

Beckenham, *June 21st*. HENRY M. SAYERS.

Radiant Heat for Cooking

My only excuse for adding to the already large volume of correspondence on the above subject is that it may be considered that an experienced view from the Antipodes is of service. I have not only designed, patented, and placed in service many types of extra-low voltage equipments using this principle for cooking purposes, but for the past six years have had in operation in my own home a cooking range in which all the cooking elements operate at extra low voltage, and are of the open radiant-heat type; many others have also installed these equipments. During that period, I have experimented with several types of such elements, and have kept accurate records of technical details and of operating and maintenance costs. As a result of this and other experience, and of trials with both gas ranges and enclosed electrical elements, I consider that, to date, the extra-low voltage cooking range has every *practical* advantage over other types.

I particularly wish to emphasise the word "practical," since I am aware that the usual published laboratory, or academic, tests of heating elements are of little value to the layman, who merely requires (a) the best actual cooking performance at (b) the least annual cost. He (or she usually), under heading (a), asks for quick speed, uniform heating, provision for simmering, safety and general good appearance, with ease of cleaning of the range throughout. He (or she) does *not* desire to be forced to purchase ultra-flat-bottomed cooking vessels that may lose their initial shape and efficiency to *conducted* heat.

The point of greatest importance in justification of the somewhat higher first cost of the extra-low voltage range is the fact that the quantities of liquids to be heated in saucepans, etc., rarely equal the quantities shown in laboratory tests, *viz.*, 2 to 3 pints, but usually consist of smaller amounts of liquids (not always at meal times), involving a considerable aggregate per annum of energy (and money) for preliminary heating of the usual type of hot-plate. Nor does the use of the sheathed type of element solve this difficulty.

My own experience proves that the annual energy consumption of a domestic range, using the radiant heat principle throughout, effects a sufficient saving to pay for the use of its transformer well within the first 12 months of service, and that the use of 32 V, with regulation from the 16-V tap of the transformer, gives all that the housewife requires in reliability, safety, and the other factors above mentioned. Any portable apparatus attached to the extra-low voltage power point provided on the range is absolutely safe, and even on short circuits no nerve-wracking "explosion" is experienced.

From the supply authority's aspect, the fact that voltage taps are available on the 230/240-volt side of the transformer is of advantage in enabling the full heating service to be given under low *supply* voltage conditions, and, moreover, there is no difficulty or risk in the use of such transformers designed and installed for the full 400/415 V of any two phases of a three-phase service. The old bogy sometimes raised, suggesting that the power factor of such transformers on no load may have a cumulatively serious effect on the mains system is, in practice, of no account, inasmuch as the switching on of the main switch of the range (usually alongside it) and any one element, immediately raises the power factor to well over 90 per cent. The no-load loss of the transformer, as locally used, is roughly 80 W. All these technical considerations, whilst of importance, are, as indicated above, of quite secondary importance to the user of the range, but are certainly of some value to the supply authority, who may also be the servicing authority.

I do not believe that the extra-low voltage range is likely to be the "poor man's" range if first cost is the main consideration, but I am firmly of opinion that it is the solution of the economic electric cooking problem.

I may add that the sample range of this type exhibited in London about twelve months ago did not contain the details of boiling element to my own design, which will give all the required speed characteristics, with long life and low servicing charge.

W. H. MYERS, B.E., M.I.E.(Aust.).
Sydney, N.S.W., *May 13th*.

Non-tracking Plastics

My article on "Non-tracking Plastics" has attracted the attention of Mr. J. B. Tucker, who objects to the phrase "Problem solved." It is, however, a fact that plastic mouldings can now be obtained in which tracking does not occur under all circumstances likely to be met with in practice.

This is not to say that finality has been reached and that further improvements are not likely to be made. Plastic mouldings have their uses, but obviously they are not the solution to every problem PHILIP KEMP.

London, W.1, *June 17th*.

Illegible Signatures

In connection with an advertisement which we recently inserted in your journal we have been astounded to find that in about 50 per cent. of the replies the writer's signature is entirely undecipherable. This fact is all the more astonishing because in each of these cases the handwriting in the body of the letter is quite good and every word is readable.

In our opinion the character of the person who answers an advertisement in such a manner should be judged by his signature as being slipshod and careless in his habits, and we have for the moment eliminated such applications from our interview list. Perhaps this hint may have a good effect.

June 21st. ADVERTISER.

I.E.E. Overseas Members

THERE were about 150 present at the conversazione of overseas members of the Institution of Electrical Engineers, which was held on June 16th at the I.E.E. building. Included in the number were members of the Council and of the Overseas Activities Committee and the general secretary, Mr. P. F. Rowell, and members of his staff. On the conclusion of the reception by the President, Sir George Lee, and Miss Lee, the gathering adjourned to the lecture theatre, where short addresses were given by Mr. H. Nimmo and Major B. Binyon.

Mr. Nimmo spoke on "Electricity in Burma," a country three times the size of Great Britain, which is essentially agricultural, no less than 70 per cent. of its 15 million inhabitants being engaged in growing paddy.

[*Elec. Rev.* photos.

At the I.E.E. Overseas Conversazione: 1. Standing: Messrs. C. S. Taylor, J. H. Wilson, J. S. Whitney, L. B. Harmer, C. H. Mellor, A. S. Phillips and F. Gill (all of China). Seated: Mrs. J. H. Wilson, Miss I Gill, Mrs. J. S. Whitney, Mrs. C. H. Mellor and Mrs. F. Gill. 2. Mr. L. S. Anan (India) being received by the President. 3. Mr. C. Cater (Brazil), Mr. and Mrs. P. D. Webb (Burma), Mrs. C. Cater and Mr. J. R. H. Morgan (Australia). 4. Mr. and Mrs. P. V. Rasu (India).

The largest concern is the Rangoon Electric Tramway and Supply Co., which, apart from the trams (now being replaced by trolley buses), supplies a demand mainly for lighting and fans, the latter being mostly locally made mat punkahs. The domestic supply was at 115 V, but in 1924 the company obtained a new fifty-year franchise on condition that the system was changed to 230 V, free of cost to consumers.

In Mandalay the Burma Electric Supply Co., which started as a tramways concern, formerly distributed electricity for domestic and general supplies at 500 V (two wire), lamps and fans being run two in series. Mandalay is a very dry place and most of the houses are wood or mat and thatch construction, and Mr. Nimmo could recall no fatal or serious accident on a consumer's premises. In 1927, the company was granted a new fifty-year franchise subject to its adopting low voltage, free of cost to the consumers.

Besides Rangoon (400,000) and Mandalay (110,000), only Moulmein has a population of over 60,000. Electricity supply is under the control of a Burmese minister on whose behalf the Electrical Inspector to the Government administers the Electricity Act and is responsible for its safe use. A supply of electricity is available in every town and in a number of villages. There are about 100 authorised undertakings, all company owned, and there is no gas.

Major Binyon followed with an address on "Accelerated Motion Cinematography in Natural Colours." This was illustrated by a film, and his apparatus was afterwards demonstrated in the library during the reunion which provided the customary finale to an enjoyable evening.

The New Meters Act

FURTHER explanatory notes have been issued by the Electricity Commission in regard to the testing and certification of meters in accordance with the Electricity Supply (Meters) Act, 1936 (Stationery Office, 2d.). The "appointed day" fixed by the Minister of Transport is July 1st, so that after the end of the present month all meters (except those covered by special agreement) that are to be installed on the premises of ordinary consumers must be certified. This applies also to existing meters which are disconnected and removed after the date and subsequently reused.

Undertakings which have not yet made the required arrangements for testing should get into touch at once with the meter examiners for their areas. Those which have not yet submitted meters for voluntary certification should refer to previous Notes of the Commissioners dated September 14th and December, 1937. The provision of standard and substandard instruments in accordance with the Memorandum "Approval of Apparatus" dated June 4th, 1937, is not in itself enough to ensure the requisite accuracy. The employment of fully trained personnel is also essential.

Apparatus used for testing meters to be submitted for certification must have been approved for use on a temporary or continuing basis as set out in "Approval of Apparatus." No fee will be charged for recertification of prepayment and electrolytic meters on circuit, the seals of which have been broken for minor adjustments not affecting their registration or for resetting, until twelve months after the appointed day.

Recently the Commissioners have approved the use of Ah meters and Wh meters of the commutator type for a further ten years. Existing double-coil meters will be approved if one of the coils is cut out so that kWh are registered directly on the dials without a multiplying factor.

Sub-standard d.c. voltmeters of the dynamometer (when not the moving-coil) type required for testing indicating wattmeters, if under construction before last December, will be approved subject to their compliance with a specification included as an appendix. Two appendices specify the conditions under which reconditioned potentiometers may be used in connection with d.c. voltage measurements in testing stations. A specification for a d.c. "voltage standardiser" for use in conjunction with a standard potentiometer in the calibration of wattmeters is given in a fourth appendix.

Both sub-standard potentiometers and sub-standard d.c. (dynamometer and moving-coil) voltmeters must be calibrated on each occasion before use for the correct voltage.

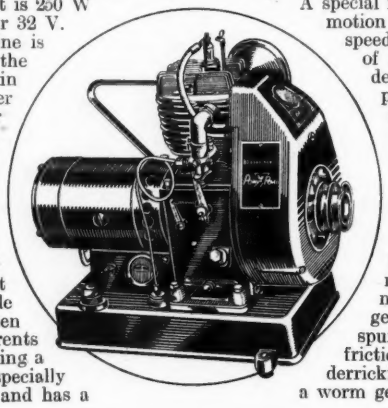
D

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Small Generating Sets

The agency in this country for the "Pony Power" generating sets has been acquired by GORDON EQUIPMENTS, LTD., 25, Milton Street, London, E.C.2. The output is 250 W and the plant can be supplied for 12 V or 32 V. The ¾-h.p. single cylinder four-stroke engine is available with coil or magneto ignition in the 12-V size but only with magneto ignition in the 32-V size. A push-button starter situated on the left end of the generator permits starting of the unit by using the battery, an auxilary rope starter or kick starter being available for occasions when the battery charge is low.



The "Pony Power" generating set

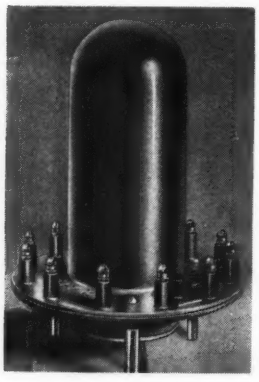
A Welding Machine

No knobs, switches or rheostats are fitted to the new "Marquette" arc welder for which EQUIPMENTS, LTD., 152/156, Great Portland Street, London, W.1, are the sole concessionaires. Instead there are fifteen plug sockets which deliver fixed currents from 20 to 250 A, the plugs and sockets being a tapered fit. The transformer has been specially designed to give a smooth flow of power and has a louvred top through which the warm air rises, the cool air entering through a screen at the base of the transformer.

The three models, which are of unusually attractive appearance, have ranges of 20-250 A, 20-150 A and 20-200 A respectively.

An Electric Fountain

A fountain unit, complete with twelve jets giving sprays up to eight feet in height, has just been marketed at a very low price by GRAHAM FARISH, LTD., Masons Hill, Bromley, Kent. It is operated by a 1/12-h.p. ball-bearing electric motor mounted in the vacuum dome and cooled by cold air and water circulation. Having no valve, glands, pistons or other wearing parts, the pump needs no attention.



The Graham Farish electric fountain

Four different types of jets are available and are immediately interchangeable, the height of the sprays being variable by means of knurled head adjusters. A levelling device makes it easy to ensure that the fountain is vertical. The water intake is fitted with a strainer, and provision is made for a hose connection for operating waterfalls, garden watering, &c. The maximum water output is 8 gal. per min. Six feet of waterproof cable is provided.

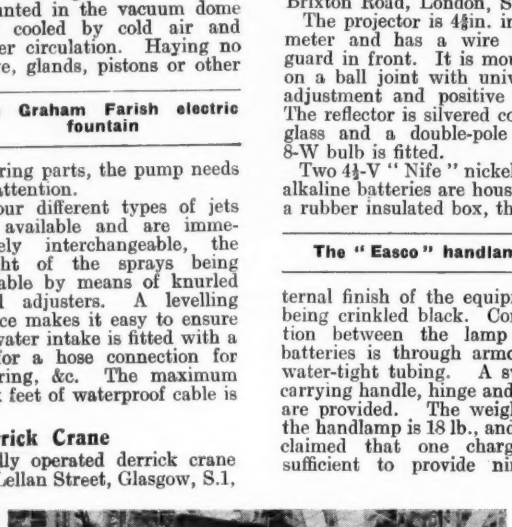
An Improved Derrick Crane

In the latest design of electrically operated derrick crane made by BUTTERS BROS. & Co., McLellan Street, Glasgow, S.1, standardisation has been carried out extensively for all components to reduce maintenance, and special attention has been given to the disposition of the gearing, which is compact yet accessible.

The hoisting barrel is driven through spur gearing by a 15-h.p. Crompton-Parkinson slip-ring induction motor, half-hour rated and running at 700 r.p.m., with E.M.B. control gear. The motor pinion transmitting the power to the driving shaft is mounted on an extension shaft which is connected to the armature spindle on a ball-bearing bracket. Two speeds of hoisting are available. The higher speed is obtained by single reduction spur gear from the driving shaft lifting 1¼ tons at 130 ft. per min., and the low speed by double reduction spur gear lifting 3 tons at 50 ft. per min. The speed change is effected by a sliding pinion mounted on the driving shaft and operated by a hand lever on the control platform. The clutch-operated derrick gear is driven from the hoist barrel shaft by single purchase spur gear, the ratio of which is such as to give the desired load path to minimise the power required to lift the jib.

A special feature of the crane is that the derricking motion can be operated from the hoist gear high speed which effectively reduces the time cycle of operations. Also there is an interlocking device between the derrick clutch lever and pawl lever. The crane is slewed by an independent motor, developing 5 h.p. at 695 r.p.m., through a train of spur gearing and revolves round a large diameter cast-steel rack with machine-cut teeth. A slip friction device is interposed between the motor and the rack to protect the gear from overload should the jib strike an obstacle.

Single-motor cranes of this design are manufactured, being similar to the twin-motor type with the exception of the slew gear, which is driven by single reduction spur gearing from the driving shaft through friction cones. A separate motor for the derricking motion can be fitted driving through a worm gear unit.



A Butters derrick crane

Metal Wall Plugs

The RAWLPLUG CO., LTD., Cromwell Road, London, S.W.7, announces the introduction of a screw anchor in metal, to supply a demand for a fixing to overcome prejudice against non-metallic methods without sacrificing resiliency. A special flange enables it to be used in "bottomless" holes such as in partitions and hollow bricks.

An Accumulator Handlamp

A handlamp for policemen, fire brigades and air raid work has been introduced by EASCO ELECTRICAL SERVICE, 1, 3 and 18, Brixton Road, London, S.W.9.

The projector is 4⅝in. in diameter and has a wire mesh guard in front. It is mounted on a ball joint with universal adjustment and positive lock. The reflector is silvered convex glass and a double-pole 6-V, 8-W bulb is fitted.

Two 4½-V "Nife" nickel-iron alkaline batteries are housed in a rubber insulated box, the external finish of the equipment being crinkled black. Connection between the lamp and batteries is through armoured water-tight tubing. A swivel carrying handle, hinge and lock are provided. The weight of the handlamp is 18 lb., and it is claimed that one charge is sufficient to provide nine hours continuous lighting.

The "Easco" handlamp

An Unusual Standard Lamp

Among a number of new American standard lamps now available from RITELITE, whose new premises have just been opened at 67, New Bond Street, London, is one particularly interesting model styled the seven-way lamp. This provides its main illumination from a large inverted bowl unit at the top containing a double filament lamp which gives 100, 200 or 300 W as required. Below this bowl unit are three smaller inverted type fittings each taking a 25-W lamp, the switching arrangement permitting one, two or all three units to be on circuit. Furthermore, in the base is incorporated a 15-W lamp, which serves either as a night-light or as an indication of the position of the standard in an otherwise dark room. The lamp, which can be supplied in various attractive sprayed metal finishes, is fitted with a pure silk shade.

The same company also has an attractive range of Chinese table lamps.

British Overseas Electrical Trade

As in April the electrical side of Britain's export trade last month was outstanding in that shipments were up in value on 1937 (18 per cent.) while trade as a whole contracted

WITH machinery exports again much in excess of last year the value of electrical equipment sent abroad last month was £264,162 (18 per cent.) up on May, 1937. So far this year electrical machinery exports have exceeded those of the corresponding period of 1937 by over 4,500 tons in weight and by £892,000 in value. Converting and transforming plant exports have been responsible for much of this improvement, rising by 2,000 tons and £283,000; last month their value was twice as much as in the previous May.

TABLE I.—EXPORTS AND IMPORTS DURING MAY

	Exports. May, 1938.	Exports. Inc. or dec. compared with May, 1937.	Imports. May, 1938.	Imports. Inc. or dec. compared with May, 1937.
Submarine telegraph and telephone cables	£17,988	+ £17,983	*	—
Telegraph and telephone wires and cables (not submarine)	99,449	+ 18,831	*	—
Other insulated wires and cables	251,128	− 62,315	£30,132	− £12,885
Radio receivers, not radiograms (excluding valves)	21,954	− 6,344	9,849	− 3,172
Radio transmitters (excluding valves)	28,409	+ 10,022	*	—
Radio valves	33,771	− 622	7,283	− 17,100
Other radio parts and accessories	34,820	− 11,924	45,066	− 58,284
Telegraph and telephone apparatus (other than radio)	253,575	+ 59,362	*	—
Electric carbons	*	—	7,312	− 7,817
Incandescent lamps	45,188	− 10,323	11,717	− 1,928
Other lighting apparatus	54,768	+ 7,521	37,139	+ 380
Primary batteries	13,516	− 2,011	*	—
Accumulators	35,445	− 14,907	*	—
Electric cooking and heating apparatus	30,713	+ 339	*	—
House service meters	22,811	+ 8,964	*	—
Other electrical instruments	24,488	+ 7,444	32,897	+ 9,096
Insulating materials not elsewhere specified	18,954	+ 4,425	*	—
Unenumerated electrical goods and apparatus	111,136	− 565	59,215	− 12,245
Electric generators up to 200 kW	31,602	+ 5,086	*	—
Electric generators over 200 kW	86,878	+ 45,004	*	—
Electric motors	147,102	+ 32,377	26,778†	− 8,708
Convertors and transformers	117,050	+ 65,427	*	—
Starting and controlling gear for motors	46,631	+ 10,955	*	—
Switchgear	153,708	+ 59,368	*	—
Other electrical machinery	13,608	+ 3,164	11,858	− 5,558
Electric vacuum cleaners	35,166	+ 16,901	22,239	+ 6,249
Total	£1,729,858	+ £264,162	£301,485	− £111,972

* Not classified separately. † Not railway and tramway motors.

The accompanying smaller table, compiled from information given in the Board of Trade return for the month, shows that altogether electrical exports had a value of £1,729,858, which compares with £1,710,612 in April and £1,465,696 in May, 1937, but it has to be taken into account that in both comparisons the past month contained two additional working days.

The appreciable contraction in exports of wires and cables followed a similar decrease in April. For some time the figures in this section have, however, been exceptionally high, rising last year by £1,454,000, or nearly 50 per cent., so that some diminution was to be expected. The following analysis of shipments of wires and cables other than telegraph and telephone types (the values in parentheses are for May, 1937) show that the falling-off was general:—

Rubber insulated wires and cables.—Australia, £31,606 (£37,324); South Africa, £19,397 (£35,598); British India, £13,148 (£14,217); New Zealand, £6,219 (£6,376); other British countries, £22,446 (£19,012); and foreign countries, £16,374 (£18, 679); total, £109,190 (£131,206).

Electric wires and cables, insulation other than rubber.—South Africa, £46,447 (£40,718); Australia, £30,458 (£56,205); British India, £16,914 (£24,510); other British countries, £24,443 (£32,540); and foreign countries, £23,676 (£28,264); total, £141,938 (£182,237).

An opposite trend is noticeable in the case of telegraph and telephone apparatus, exports of which so far this year have attained the value of £1,120,086 against £786,732 and £695,633 in the equivalent periods of 1937 and 1936. Last month Australia was again the principal customer with £75,549 (£55,012 in May, 1937), other destinations being: South Africa, £36,192 (£15,101); other British countries, £60,040 (£78,401); Argentina, £26,836 (£9,100); and other foreign countries, £54,958 (£36,599).

The improvement in radio exports in the first quarter of the year seems to have come to an end, with the exception of transmitting apparatus which has now reached a value of £192,441 against only £71,752 up to the end of May last year. Radio receivers shipped from this country in May numbered 3,577 (5,429 in May, 1937), and valves 127,666 (128,681). Fewer electric lamps were also exported (1,349,000 against 1,756,000), but the value of lighting apparatus dispatched overseas was £7,521 higher. It is pleasing to observe that British manufacturers of meters are achieving greater success in overseas markets—in 1937 this was the only item among goods and apparatus showing a decrease. Last month the number of meters exported was 19,427 against 12,917 in May, 1937.

Much of the expansion in machinery exports as compared with the corresponding month of last year was due to the increase in shipments to South Africa (from £90,280 to £188,859), and unspecified foreign countries (from £57,639 to £149,180). In tons, exports of machinery last month were as follows (May, 1937, weights in parentheses):—Generators, 521 (420); motors, 957 (926); and other machinery, 1,960 (1,063).

Importers of electrical equipment into this country again fared badly, the total (£301,485) being £111,972 (27 per cent.) down on May, 1937. This is partly accounted for by the high radio import values of last year, but last month's figures were also below those for May, 1936.

An indication of the chief sources of electrical apparatus imports last month is given in the following analysis (May, 1937, figures in parentheses):—United States, £68,836 (£106,210); Germany, £57,179 (£77,968); Netherlands, £29,827 (£65,711); Belgium, £20,435 (£17,733); Switzerland, £15,236 (£16,161); France, £10,484 (£9,951); Austria, £2,776 (£4,654); other foreign countries, £21,620 (£25,479); and

TABLE II.—BRITISH ELECTRICAL EXPORTS DURING MAY

Destination.	Goods and apparatus, May, 1938.	Inc. or dec. compared with May, 1937.	Electric generators, May, 1938.	Inc. or dec. compared with May, 1937.	Electric motors, May, 1938.	Inc. or dec. compared with May, 1937.	Other electrical machinery, May, 1938.	Inc. or dec. compared with May, 1937.
Eire	£30,927	− £8,452	*	—	*	—	*	—
Channel Islands	14,576	− 1,636	*	—	*	—	*	—
Palestine	5,395	− 27,152	*	—	*	—	*	—
British West Africa	10,041	− 8,305	*	—	*	—	*	—
Union of South Africa	174,901	+ 7,333	£44,653	+ £41,434	£24,822	− £3,577	£119,384	+ £60,722
British India	96,045	− 24,231	13,050	+ 797	14,270	+ 2,479	47,120	+ 14,406
British Malaya	26,815	− 2,387	*	—	*	—	9,883	+ 1,888
Ceylon	13,262	+ 7,112	*	—	*	—	*	—
Hong Kong	15,527	+ 10,888	*	—	*	—	*	—
Australia	198,616	− 1,671	5,608	+ 1,450	20,875	+ 5,834	23,292	+ 425
New Zealand	77,639	− 19,107	*	—	6,823	− 988	19,943	+ 10,209
Canada	10,475	− 5,673	706	− 2,844	10,140	+ 3,458	6,552	+ 3,414
Other British Countries	55,417	+ 9,256	28,275	− 9,501	12,089	− 4,806	30,804	+ 9,583
Sweden	10,334	+ 1,163	*	—	*	—	*	—
Denmark	12,130	− 8,613	*	—	*	—	*	—
Netherlands	18,690	+ 82	*	—	*	—	3,332	+ 848
Belgium	11,658	− 1,957	*	—	*	—	*	—
France	15,385	− 5,434	*	—	*	—	1,823	− 1,773
Portugal	7,711	− 8,778	*	—	*	—	*	—
Spain	585	− 1,530	*	—	*	—	*	—
Italy	8,216	+ 5,864	*	—	*	—	*	—
Greece	2,669	− 4,327	*	—	*	—	*	—
Rumania	17,950	+ 15,134	*	—	*	—	*	—
Egypt	25,696	+ 18,836	*	—	*	—	1,597	+ 659
China	4,700	− 3,053	*	—	*	—	649	− 4,537
Brazil	16,693	+ 6,839	*	—	*	—	*	—
Argentina	73,085	+ 26,102	*	—	*	—	1,709	+ 260
Other Foreign Countries	142,945	+ 49,577	26,188	+ 18,754	58,083	+ 29,977	64,909	+ 42,810
Total	£1,098,113	+ £25,880	£118,480	+ £50,090	£147,102	+ £32,377	£330,997	+ £138,914

* Not classified separately. Vacuum cleaners are included in Table I but not in Table II.

British countries, £14,217 (£20,698). For the period up to the end of May only France has gained on last year's figures (£54,164 against £31,624), no doubt due to the favourable exchange rate, and the values would therefore represent a greater increase in quantity.

Details of imports according to number (or weight, where specified) are as follows:—Radio receivers, 3,112 (3,712); valves, 57,632 (307,782); electric carbons, 4,671,000 (32,457,000); electric lamps, 5,489,000 (4,306,000); motors, other than railway and tramway, 171 (206) tons; and other machinery, 31 (53) tons.

In the first five months of this year exports have aggregated £8,993,891, an increase of £1,805,600 (25 per cent.), and imports £1,557,622, a decrease of £412,414 (21 per cent.).

Parliamentary News

(BY OUR SPECIAL REPORTER)

Planning Generating Plant Programmes

IN the House of Commons on June 15th Mr. Ellis Smith asked the Minister of Transport if he would consult the Central Electricity Board for the purpose of considering future requirements and developments of power supply, the need to work to a plan, and adopt a policy of giving orders for plant to industry when manufacturers mostly required the orders.

Mr. Burgin said that considerable time was required for manufacturing, installing and bringing into use large additional units of generating plant for the purposes of the grid system. It was the practice of the Central Electricity Board to keep under constant review the prospective growth of demand on the system and to work to a plan based upon such growth; and in so doing to bear in mind the considerations to which the hon. member had drawn attention.

Electrical Treatment of Rheumatism

Mr. D. Adams asked the Minister of Health whether he would take steps to place electrical treatment at the disposal of rheumatic patients under national health insurance since this treatment, of proved beneficial effect in a disease occasioning great annual loss in this country, was not now available to panel patients.

Mr. Elliott said that the medical benefit to which insured persons were entitled as a statutory benefit was limited to services within the competence of general practitioners as a class and he had no power to extend the scope of the benefit. A number of approved societies, however, had made provision by way of additional benefits for the electrical treatment in approved institutions of their members suffering from rheumatism.

Municipal Supplies

On June 17th the Ministry of Transport Vote was considered in Committee of Supply in the House of Commons. After a speech by the Minister in which he did not refer to electricity, Mr. Herbert Morrison called attention to the apprehension that was felt in municipal quarters that they were not being given proper consideration in relation to proposals for the amalgamation of electricity areas and proposed amalgamations between companies and municipalities. He said that in some cases—Oxford, for instance—a certain amount of pressure, which was resented, was being brought to bear with a view to the absorption of municipal undertakings by company undertakings. The Labour Party took the view that publicly owned electricity undertakings had proved their great value to the country. Generally speaking, they had shown great initiative and enterprise, and ought to be encouraged rather than discouraged.

There was, he said, another point on which the Minister had powers to determine the general level of the operation of electricity undertakings. A very considerable proportion of private electricity undertakings were making unreasonably high profits out of their consumers. He very much hoped that the Minister and the Electricity Commissioners would use all their powers, not with a view to confiscating these undertakings, but to keeping their profits down to a reasonable level, certainly a level which was consistent with their public utility status. This was a matter of importance for the future, because some day British electricity supply would become entirely a public concern of one sort or another.

Mr. Burgin, the Minister of Transport, said that he had not mentioned electricity in the review he had given because he felt that the subject was really worthy of a debate entirely on its own. He felt it a little difficult on a Friday, with the limited time at their disposal, to embark on the subject of electricity as well as transport matters. That was the only reason why he excluded it.

In the Courts

Shock from a Refrigerator

LORD KEITH, in the Court of Session, Edinburgh, on June 15th, gave his decision in an action brought by an Ayr woman who received a severe electric shock when opening the door of a refrigerator installed in her house. She claimed £1,500. The respondents were William Govan & Sons, Ltd., building contractors, Prestwick, Ayr.

The action was laid both upon contract and upon negligence, but upon the evidence the case of negligence broke down. The case his Lordship had to consider stood wholly on alleged breach of contract. The contract relied upon by the plaintiff was contained in an offer by the respondents, accepted by the plaintiff, to erect a house for an inclusive sum. A refrigerator was included in the specification of the house.

The plaintiff entered into possession of the house on June 4th, 1935. On January 12th, 1936, she went to open the door of the refrigerator, and, on putting her hand on the handle of the door, sustained not only a very severe electrical shock, but, in struggling to free herself from the refrigerator, fell and received a serious fracture of her left arm. In spite of massage and surgical treatment in hospital the plaintiff remained permanently disabled, being unable to raise her arm to the level of her shoulder.

Lord Keith said he was prepared on the evidence, to hold the respondents liable in damages to the plaintiff for breach of contract. He estimated the extent of the plaintiff's damages at £1,220, for which sum he granted decree. In his Lordship's opinion there was an implied obligation on the builders to supply a safe and habitable house. The respondents were responsible for supplying a refrigerator with a wrong type of motor. They were liable on contract to rectify that error, and they were also liable for the defects which made the refrigerator unsafe. They might have remedies against the sub-contractor, but that was no concern of the plaintiff.

Radio Patent Action

The House of Lords, presided over by Lord Atkin, after hearing arguments lasting 21 days, reserved judgment on July 16th in the appeal by Electric & Musical Industries, Ltd., and the Boonton Research Corporation from the judgment of the Court of Appeal reversing the judgment of Mr. Justice Luxmoore in the Chancery Division against Lissen, Ltd., and G. Kalis for alleged infringement of patent. (Reported in the ELECTRICAL REVIEW of August 6th, 1937.)

Action Settled

The action Herrod *v.* Automatic Electric Refrigerators, Ltd., was in the list for hearing before Mr. T. Eastham, K.C., the Official Referee, on June 17th. Before the hearing of the case was reached counsel for the plaintiff stated that the dispute had been settled, it being agreed that the plaintiff should withdraw the action on the terms contained in a written document dated June 14th, 1938, and signed by the plaintiff and by and on behalf of the defendants.

The Official Referee assented to the withdrawal as requested.

Electricity in the Cinema

A review of the Cinematograph Exhibition at Folkestone

THE cinema appears to be the natural home—or perhaps nursery would be the better description—of decorative lighting. It is, in fact, in this direction that electrical interest is mainly centred at the exhibition which is being held this week at Folkestone in connection with the annual conference of the Cinematograph Exhibitors' Association.

Considerable possibilities are opened up by the recent developments in fluorescent lighting. Curtains and artificial flowers treated with fluorescent material and subjected to ultra-violet light from B.T.H. "Mercra" lamps form an impressive display on the Sound and Cinema Equipment stand, while a sparkling effect is introduced in three electrically operated fountains (shown by Strand Electric) by adding fluorescent dye to the water. The ability to change completely the appearance and colour of dresses on the scene portrayed on the stage backcloth, &c., is suggested by a fascinating model prepared by the G.E.C., who are also demonstrating the attraction of "Osira" colour floodlighting and architectural lighting for both interior and exterior use.

Since it was first introduced in 1934, the Holophane "Moulded Contour System" of colour lighting has been making rapid strides, and its uses are not being confined to the cinema alone. Improvements have been made to the "Auto-Selective" control system which can now be left to operate itself if desired. For the concealed lighting (three or four colours) of shallow cornices the company has just brought out the "Cylo" trough, only 4 in. deep, giving remarkably uniform and shadowless illumination.

Combined "recitals" of music and colour are becoming an increasingly popular attraction of many cinemas, and there

is on the Holophane stand a Würlitzer organ with lighting effects incorporated. Yet another Holophane innovation is a new invention which was described to us as "dissolving coloured forms projected in light." There seems to be a big future for this in the interior decoration of cinemas, since it is possible to throw designs, which are constantly changing in both colour and form, on to the walls and ceiling.

A full-sized curtain with three-colour lighting, which the Strand Electric are showing in conjunction with Hall & Dixon, provides an opportunity for demonstrating a compact new type of dimmer, a single unit of which controls all three colours. A similar dimmer is made by F. H. Pride, who are employing a model for displaying a new type of photographic reproduction on glass giving a relief effect. The same company has just placed on the market three imposing semi-indirect floor standard lighting units finished in anodised aluminium and specially suitable for cinema foyers, etc.

Some entirely new designs in "Internalite" direction signs make their appearance among a representative display of K.F.M. products, while a new Girosign stainless steel frame displays six tinted "stills" and raised letter titles illuminated from behind. The Etna Lighting & Heating Co., who are now marketing the "Candar" air conditioner, told us that they have carried out no fewer than thirty-five complete cinema electrical installations in the past twelve months.

Projection and Sound Equipment

We noticed several improvements and modifications of projection and sound equipment. One of the most comprehensive displays, that of G. B. Equipments, is laid out as a cut-away section of an actual operating box. Here are shown two of the principal equipments supplied, the "Duosonic Q" apparatus in conjunction with the "Magnus" projector and "P.U.3" driven sound head, and the "Duosonic S" with a similar "Magnus" mechanism but with the new "P.T.1" pull-through type of head. A new "Brenkert" lamp fitted on the latter equipment can be used as either a low intensity or "high-low" as desired. The amplifier is of semi-rack construction, which is of particular use for restricted box dimensions. Both equipments incorporate a new type of stand, which houses all the projector and arc controls together with the wiring.

One of the latest Hewittic rectifiers with choke control is installed to enable the equipments to be shown in operation, and a "Magnus" mechanism with its interior open draws attention to its robust construction. A Baird television projector on view gives 8 ft. by 6 ft. pictures. On the front of the box are examples of various forms of auditorium acoustic treatment, while in the auditorium furnishing section is demonstrated the method of installation and operation of the "Multitone" deaf aid.

In view of the economies that can be obtained both in initial operating costs and in the running expenses the new "Stelmar" alternating current arc shown for the first time by J. Frank Brockliss is creating a good deal of interest. A twin optical system is employed which eliminates heterodyne effect. The new "Super Simplex" projector mechanism exhibited is extremely simple to operate and has been chosen for the new Cunard White Star liners *Queen Elizabeth* and *Mauretania*. A specially compact projector and sound equipment for schools, &c., the now well-known "Stelmar" high-intensity spot-light and the new "Stableford" all-metal screen are other items of interest on the same stand.

The new "Sturgeon-Acme" automatic feed projector arc lamp shown by Cinesales is of exceptionally solid construction and provides a light of high brilliancy evenly distributed over the whole screen. Pathé Equipment are making a special feature of the Ross projectors, and Kalee give an opportunity of inspecting the improvements in the "Regal" and "Vulcan" arcs. Taylor, Taylor & Hobson have perfected a new lens for the projection of television pictures. It has a focal length of 14 in. and an aperture of f/1.8.

A model showing a ship in full sail and the inscription "The Victory is with Ship Carbons" forms a novel background for the stand of Ship Carbons who, like the G.E.C., now have available special carbons for a.c. projection.

The latest development of the B.T.H. Co. in sound film technique is the volume expansion reproducer which forms the central feature of the Sound and Cinema Equipment stand, where are also to be seen the latest B.T.H. projector with fireproof spools and 50-A high-intensity arc lantern; another type of lantern fitted with a new type of automatic feed and magnetic control enabling small high-intensity carbons to be utilised; and a selection of "Morganite" carbons.

A special display has been arranged to demonstrate the advantages of the R.C.A. Photophone rotary stabiliser sound head. By the use of a fluid flywheel drive incorporated between the motor and the sound head vibration is eliminated and better high-frequency reproduction is obtained. No actual equipment is shown on the Western Electric stand, which is intended to portray the growth of the company's business. Among new sound insulation materials displayed by Newall's Insulation Co. are to be seen a fireproof acoustic board and corrugated "Paxtiles." A working model demonstrates the silencing of a ventilation duct.

The elimination of ballast resistances on the Westinghouse metal rectifiers and the use of a special ballasting circuit results in a very high efficiency and power factor with a corresponding decrease in running costs. A twin 45-A, 60-A equipment is seen in operation. Three rectifiers are shown by the E.C.C., a battery-charging unit, a double metal rectifier for two arcs, and an induction control type mercury-arc unit. Complete control by one master switch is the outstanding feature of the redesigned "Nife-Neverfayle" emergency lighting system demonstrated by Batteries, Ltd.

Employing electrostatic tone generators the new Compton organ is entirely self-contained and incorporates a standard console.

Civil Engineers' Conversazione

THE customary display of engineering models and scientific apparatus at the Institution of Civil Engineers on the occasion of the annual evening conversazione on June 15th consisted of over fifty items. Among them Mr. F. Gill demonstrated standing waves on Lecher wires, the fact that the distance between any two maximum values is equal to one-half of the wave-length of the applied oscillations being indicated by using fine tungsten wires enclosed in evacuated glass tubes. Oscillations of a frequency of 150 megacycles per second were generated by means of a push-pull oscillator employing two recently developed ultra-short-wave valves, and the positions at which the voltage between the wires was a maximum were demonstrated by placing a long glass tube, filled with gas at low pressure, between the wires. Where the voltage between the wires was sufficiently high, a luminous discharge was set up in the tube, and the centres of the luminous patches were the positions at which this voltage had its maximum values. If the ends of both pairs of Lecher wires were short circuited the points of maximum discharge occurred at positions on the one pair corresponding to positions of minimum current on the other, thus showing that voltage and current were 90 deg. out of phase.

A demonstration of electron transit time in a cathode ray tube showed how the magnitude of the displacement of the electrons on leaving the field of the deflector plate depended, among other things, upon the phase of the applied oscillation at the instant that the electron entered the deflecting field. A special cathode-ray tube was used, having one pair of deflector plates 10 cm. long. High-frequency oscillations were applied to the plates and by varying the voltage on the final anode of the tube the trace on the screen was made to pass through a minimum value. Knowing the dimensions of the deflecting plates and the value of the critical anode voltage, the frequency of the applied oscillations could be determined.

Sir Robert Hadfield's exhibits included a demonstration of reversible magnetic changes below atmospheric temperature in a non-magnetic steel. Dr. C. C. Paterson showed a laboratory form of telephoto camera adapted for examining the performance at long range of the reflectors used in long-throw projectors, such as aerodrome landing floodlights.

Marconi-Ekco Instruments, Ltd., showed a type-TF.500 noise meter, which is direct reading in phons; auxiliaries include a piezo-electric pick-up for use instead of the microphone when mechanical vibration is to be measured. The medical "theracoupler," for the production of heat in the deep-lying tissues is operated by a valve oscillator functioning at 15 Mc, the 160 W output being capacity coupled to the patient. There was also a liquid-flow indicator applicable to other purposes than large water-cooled radio valves for which it was originally designed.

The National Physical Laboratory's display included a rotating loop radio direction finder for waves between 6 and 10 metres in length; the outfit is of small dimensions and enables bearings to be observed within a fraction of a degree.

Mr. B. E. Martin had on view an integrating radiometer (Radiation, Ltd.) for measuring the radiant efficiency of all kinds of domestic fires, including electrical types. The sensitive element consists of two balanced sets of corrugated and blackened copper blocks interconnected by thermo-couples which, in conjunction with an indicator, determine the temperature difference between the two sets of blocks. The Cambridge Instrument Co., Ltd., showed a universal vibrograph.

McGowan Report Attacked

A city treasurer's criticism

AT the annual conference of the Institute of Municipal Treasurers and Accountants at Southport last week, Mr. Sydney Larkin, City Treasurer, Coventry, presented a paper on "Electricity Distribution," in which he severely criticised the McGowan Report. It was, he maintained, impossible to overstate the deficiencies of the Report. One of the strong arguments in favour of electricity distribution reorganisation was that the larger undertakings would have "adequate" financial resources for carrying out comprehensive schemes of development which might not be immediately remunerative. But it was surprising to learn that in dealing with what was called the "unfructified" capital of a company in connection with its dividends the Committee recommended that this "should be restricted to such capital spent in the three years prior to the coming into operation of a scheme of development in advance of a remunerative demand." Thus, in the case of any company which had embarked on an extension of mains with the idea that it would be remunerative within a period of, say, five years or so, and the development had not proved remunerative by the date of the scheme, the shareholders would be permanently deprived of any compensation for future profits on that part of their undertaking.

Rural Areas

The Committee contended that the fact that urban areas had been developed first, leaving rural areas to be developed separately, had made the development of rural areas more difficult. Surely it was much easier to develop rural areas with the urban load as a background. The Committee seemed to be impressed by the possibility of reviving village industries, but the great industry of agriculture and food production was dismissed in two lines.

It was not satisfied that Greater London was a suitable area to be administered as one electrical unit, but its reasoning was totally unconvincing, as it was in all its other remarks. The only valid reason given was the high cost of buying out the companies. If it was uneconomical to buy the London companies, it was probably just as uneconomical to buy any other companies. Actually, the "Outline of Proposals" (the White Paper) did appear to envisage the purchase of the London companies by two undertakings, one north and one south of the Thames.

Assuming that there was room for improvement in electricity distribution, it was clear that what were possibly unpleasant facts had to be faced. He believed that there was a case for the acquisition of small distribution authorities by a power company in whose area they operated. This would go a long way towards achieving all that the McGowan Committee set out to do. There was much to be said in favour of the abolition of future purchase rights to avoid the splitting up of existing undertakings. In the case of boundary extensions the Committee did not seem to favour the obvious course of transfer of the undertaking in the added area to the local authority. It was said that the part of the undertaking in the transferred area would be one of the more remunerative parts of the outside undertaking, but obviously this position would be dealt with by purchase and compensation. The position could be further eased by allowing the extending local authority to take over a reasonably large stretch of rural area and thus relieve the company of its obligations in that direction. Not even the McGowan Committee could successfully contend that it was good to have two supply authorities in one area.

Continued Control

The electricity supply industry might be justified in praying to be left alone, yet this Committee actually suggested that some form of continued control of distribution authorities by the Commissioners was desirable in order "to ensure that a high standard of efficiency and development shall be maintained." And what was this continued control to consist of? Nothing less than their old friends—mentioned at least twenty times in the Report—the compulsory imposition of a two-part tariff, the forced adoption of hire and hire-purchase schemes and of assisted wiring, and the compulsory extension of mains into undeveloped areas "where there is a reasonable prospect of an economic return." Moreover, it was not the present "small and inefficient" undertakings which were to be treated in this grandmotherly fashion, but the larger and more efficient undertakings remaining after reorganisation.

On one point at least the Committee was absolutely wrong, without any reasonable doubt, and that was on the question of co-ordination of gas and electricity supplies where the two undertakings were under the same control. The trouble here was, as always, fundamental, and dated back to the neglect of local authorities and others concerned to see the importance of combination of the services. The outstanding loan debt in respect of gas supply in county boroughs alone was about £16,000,000. Either the industry was worthy of maintenance or it was not. If it were to be maintained, it could not be left to the mere chance of the result of competition when it might be found at the time of the country's greatest need of the products of the gas industry that it had been so crippled that those products were not forthcoming. If the industry was not so maintained, then its liquidation must be accomplished in as scientific and orderly a manner as possible without imposing too great a burden on the ratepayers.

Apart from the very obvious common services such as meter reading and accountancy which could be carried out jointly, there were several important functions connected with selling policy which should also be considered jointly. There was an unanswerable case for an amalgamation of the two services so that one standing charge might be paid and the running charge for electricity and gas so fixed as to give about equal value on each service.

Other Delegates' Views

Councillor W. Bigwood (Mayor, Sutton Coldfield), proposing a vote of thanks to Mr. Larkin, protested against the proposed extinction of the small but efficient undertakings such as his own.

Mr. P. Craven (Borough Treasurer, Hornsey), seconding the vote, criticised the Central Electricity Board's finances and said that they were being asked to agree to a further scheme which offered, so far as could be foreseen, only a prospect of increased aggregate costs for electricity distribution and therefore an increased charge per unit.

Mr. J. Pitcher (Borough Treasurer, Bury St. Edmunds) complained of the delay in the introduction of the Government's scheme for electricity distribution, and criticised the maintenance of high prices for electricity in many urban areas in order to give supplies in rural areas. Councillor F. C. R. Douglas (Battersea) disagreed with Mr. Larkin in his advocacy of the application of profits from electricity undertakings for the relief of rates, which he regarded as a system of indirect taxation on the users of electricity. Mr. E. J. Johnson (Borough Treasurer, West Ham) maintained, however, that as municipal electricity supply undertakings had received the benefit of cheap borrowing, it was not unfair that something should go back to the ratepayers. Moreover, many municipal electricity supply undertakings had made up losses in the early years from the rates.

Film Equipment for Industrial Publicity

WITH the growing appreciation of the value of films for publicity work there has developed a big demand from manufacturing and commercial concerns not only for films produced at reasonable prices, but also for practical and economical methods for displaying them. Both these needs are now being met by the Auto-Projection Co., Ltd., 93-95, Wardour Street, London, W.1, which, besides producing at low cost, silent, talking and coloured films for publicity purposes, can supply projection and sound equipment to meet all requirements. A particularly interesting unit just developed, the universal, continuous sprocketless projector, which can be hired, will take up to 400 ft. of 16-mm. sound or silent film, giving a brilliant picture 11 in. by 15 in. in daylight or artificial lighting. Plugged into any lamp socket, the apparatus is immediately ready for use, operation being fully automatic. By employing the new sprocketless system of transmission the films may be projected almost indefinitely without signs of wear. The projectors, which are housed in walnut cabinets, have either direct or reflected vision, and are suitable for continuous displays in windows and showrooms.

The universal, continuous, sprocketless projector which the Auto-Projection Co., Ltd., has developed for publicity work

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Ironmongers and the E.C.A.

Negotiations with the E.C.A. and N.E.C.T.A. were discussed in the annual report of the Electrical Section of the Ironmongers' Federated Association, submitted to the conference held at Llandudno on June 15th. The report stated that unfortunately the E.C.A. had adopted the uncompromising attitude of insisting on a complete fusion and loss of identity on the part of the I.F.A. Electrical Section. This attitude did not commend itself to the Electrical Section, which had no alternative but to join issue with the electrical contractors on the matter, much as it deplored the spectacle of private enterprise employers expending energy on such unprofitable issues when with co-operation dictated by a reasonable desire to recognise each other's views, they might be pulling together in their common interests. The Federation was still willing to discuss a scheme of co-operation along the lines already indicated to the electrical contractors. The report further stated that the practice of certain local authorities who engaged in the sale of electrical appliances to cut the rates for which they are prepared to accept hire-purchase business, so that traders who obtained their finance through the usual channels were unable to compete, had received consideration, and steps were being taken to endeavour to eliminate the practice. Mr. F. H. Morecroft (Dover) said he felt that power engineers were doing everything possible to filch the electrical trade. Only recently in one town there was a proposal to employ a traveller to canvass from door to door for hire-purchase business. Fortunately, that proposition was turned down. The conference adopted a resolution deploring the practice of municipal and supply authorities of cutting the standard recognised charges for equipment and urging manufacturers to maintain minimum rates.

E.C.A. Manchester Branch

The death of four members—Messrs. Edwards, Lightfoot, Seddon and Taylor—was referred to at the annual meeting of the Manchester Branch of the E.C.A. by Mr. S. Dickinson (vice-chairman), presiding in the absence through illness of the chairman, Mr. L. E. Wilson. The membership remained at 63, as there had been four new members during the period. There had been ten branch meetings during the year with fairly good attendances, but regular support from still more was desirable. Mr. Dickinson announced that the branch had been successful in its approach to the Corporation Electricity Department's maintenance department, having arrived at a happy conclusion in regard to consumers' own apparatus. Other forward moves included the formation of a District Joint Industrial Council covering the whole area, which had already held two important meetings. The following officers were elected: Chairman, Mr. S. Dickinson; vice-chairman, Councillor J. Whiteley (Salford); hon. treasurer, Mr. H. H. Quarmby; hon. auditor, Mr. G. E. Beckett. The branch is supporting the Manchester Electrical Circle in a movement to get the electrical contracting industry exempted from irksome clauses under the Shops Act, 1912.

Collier for Power Company

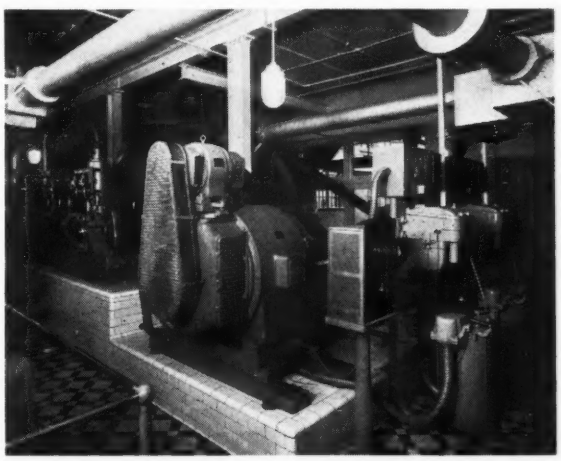
Another collier for the London Power Company was launched at Sunderland on June 14th. This is the ninth vessel of the fleet of colliers which carry coal to the company's power stations at Deptford and Battersea. It has been named the *Leonard Pearce*, after the engineer-in-chief, and the naming ceremony was performed by Mrs. Forrester, Sir Leonard Pearce's daughter. The principal dimensions of the new vessel are:—Length, 239 ft.; breadth, 38 ft. 9 in.; moulded depth, 18 ft. 3 in.; and total d.w., 2,500 tons.

New Zealand Orders for British Firms

According to *The Times* the New Zealand Government has announced that contracts valued at £154,000 have been placed with British firms for the supply of equipment for rolling stock, screening plant for coal mines, insulated rail joints, portable cranes and telephone cable.

Motors for a Brewery

The illustration shows one of three Crompton Parkinson 100-h.p. auto-synchronous motors driving a "Pontifex" 62-ton refrigeration horizontal ammonia compressor at the brewery of Davenport's "C.B.," Ltd., Birmingham. One of these machines replaced an existing 100-h.p. slip-ring induction motor, while the other two were additions when the compressor room was extended, for chilling beer, conditioning the maturing rooms, and for chilling the final bottle rinse water. All three motors were designed to operate with a leading power factor of 0.9 and at the same time as the installation was carried out the Birmingham Corporation changed over its supply from 25 to 50 cycles. The leading p.f. at which these machines



A 100-h.p. Crompton Parkinson auto-synchronous motor driving a compressor in a brewery

operate provides sufficient corrective kVA to raise the overall p.f. of the whole of the load to a figure of slightly over 0.9 lagging. Owing to the limited space, Cromptons found it necessary to change their standard design of overhung exciter and to mount the exciters on top of the motor frames, the drive being carried out by means of vee ropes.

Vacuum Cleaner Display Competition

The annual window display contest promoted by Hoover, Ltd., attracted a record number of entries, and the first prize of £50 has been awarded to the Northampton Electric Light & Power Co., Ltd., which chose as its theme "Snow White and the Seven Dwarfs," and featured an incident in which Snow White scolds the dwarfs for hiding the dust instead of taking it away, introducing the Hoover cleaner as the medium which found them out. Bury Corporation Electricity Department gained the second prize of £25, and the third prize of £10 went to Electricity House, Ltd., Goole. Consolation prizes of £5 each have

"SHE SCOLDED THEM FOR HIDING THE DUST INSTEAD OF TAKING IT AWAY"
"Snow White and the Seven Dwarfs"
The film which has made HISTORY
The New Hoover
CLEANING ENSEMBLE WHICH HAS PROVED
HIS STORY

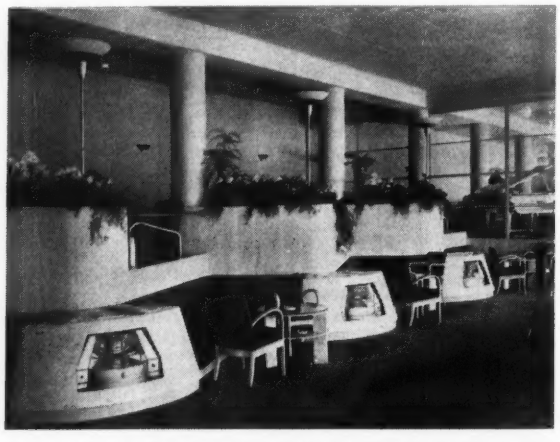
A prize-winning window display by the Northampton Electric Light & Power Co., Ltd.

been awarded to Leeds Corporation Electricity Department; Electricity House, Ltd., Wetherby; St. Helens Corporation Electricity Department; Shinner's, Sutton; Northampton Electric Light & Power Co., Ltd., Wolverton; and Hull Corporation Electricity Department.

Meters Approved

The *London Gazette* for June 10th contains a list of meters approved by the Electricity Commissioners manufactured by the following concerns: A.E.G. Electric Co., Ltd.; British Electric Meters, Ltd.; British Insulated Cables,

Ltd.; Chamberlain and Hookham, Ltd.; Compagnie Continentale d'Appareils de Mesure "Contimeter"; English Electric Co., Ltd.; Ferranti, Ltd.; George Wilson Gas Meters, Ltd.; Measurement, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Rex Meters, Ltd.; Siemens Bros. & Co., Ltd.; Smith Meters, Ltd.; Switchgear and Meters, Ltd.; and Venner Time Switches, Ltd.



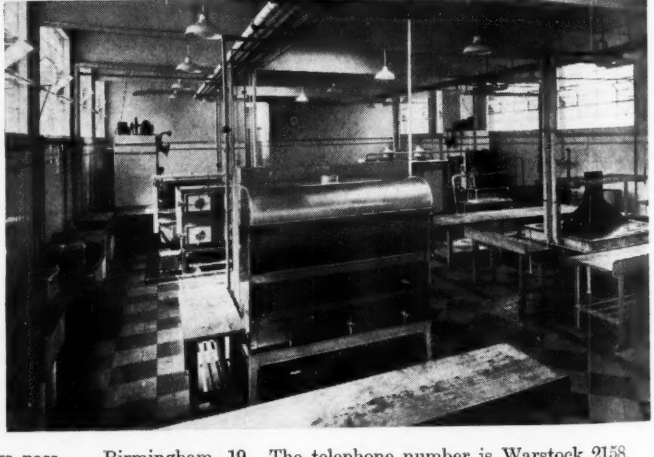
Limit "radial radiant" reflector fires installed in the Garden Club at the Empire Exhibition, Glasgow

Emergency Lighting for New Town Hall

A special "Keepalite" equipment, including twenty-six sealed-in Chloride cells having a capacity of 86 Ah at the three-hour rate of discharge, and capable of carrying a load of 28 A for three hours, has been installed at the new Chesterfield Town Hall. The electrical contractors for the building are Electrical Installations, Ltd.

A New Works Canteen

Factory production methods have been adopted at the new canteen just opened by Standard Telephones & Cables, Ltd., at its New Southgate works and are enabling no fewer than 2,000 meals to be provided in an hour with only 120 waitresses and kitchen staff. How the scheme operates was described to us by Mr. N. V. Kipping, the works manager, when we visited the canteen last week. At present approximately one-third of the 6,000 employés take advantage of the facilities offered, and their lunch hours have been "staggered" so that a certain number is released at twenty-minute intervals. Although no distinction is made between staff and workpeople the building has been divided into two sections—a canteen seating 1,000 and a restaurant accommodating about half that number. The food served in each is identical, but in the restaurant, which has the advantage of being less crowded and of having certain amenities in the way of tablecloths, flowers, &c., the prices are rather higher, a full meal costing about 1s. 4d. instead of 10d.



The new canteen opened by Standard Telephones & Cables, Ltd., at New Southgate, and (right) a view of the kitchens

Service is arranged on cafeteria lines. The customers pass in queues (which do not cross at any point) alongside the counters and collect whatever they fancy on trays, paying at cash-desks. Separate counters accessible from the restaurant or canteen serve sweet courses if these are desired later. The actual serving of each series of lunches takes just under a quarter of an hour, thus leaving five minutes for the refilling of the containers with food prepared in the kitchens on the floor above and brought down by lift (Hoisting Appliances, Ltd.). The kitchens, which are large enough to deal with probable extensions required when the factory reaches its anticipated ultimate capacity of 10,000 workpeople, have been provided with the most up-to-date labour-saving electrical equipment. Among this we noticed two 80-quart mixers and potato peelers (Hobart), a potato chipper (Crypto), a large G.E.C. baking oven and a quantity of Carron apparatus, including a main boiling plate, a double-door steamer and a three-pan fish fryer. An air-conditioned larder and coldroom (Frigidaire) are used for storing meat, fish and dairy goods. Dirty crockery collected by waitresses is taken by means of vertical conveyors (Rownson Drew & Clydesdale, Ltd.), to the basement, where two Hobart washing-up machines deal with 17,000 pieces in an hour and a quarter. Supplies of food and crockery are regulated by means of a public address system. "Claudgen" neon lighting is used to good effect in the cafeteria. A steam and hot air extraction system has been installed over the counters. Both the restaurant and the canteen are often in demand for social functions. The company has appointed a manager to run the enterprise and he receives a salary. Profits will be spent on improvements and losses will be borne by the company.

Northants Agricultural Show

A comprehensive range of electrical appliances for agricultural and domestic purposes was demonstrated on the joint stand of Kettering Electricity Department and the Northampton Electric Light and Power Co., Ltd., at the Northamptonshire Agricultural Show at Kettering on June 17th and 18th. Electric incubators, poultry plucking machines, pumps, &c., were shown, and the ease with which nearly all agricultural machinery can be adapted to electric drive was demonstrated by a wide range of equipment in motion. A range of refrigerators was on view, and a model kitchen on the stand was completely equipped with electrical appliances. Electric cooking demonstrations were given at frequent intervals throughout each day.

Holidays with Pay

The directors of Redfern's Rubber Works, Ltd., have decided to pay one week's wages at the standard rate for the Wakes holiday week to all wage-earning employés who have been in the company's service for the previous twelve months, and in the case of those who have entered the company's employ subsequent to the first week in September, 1937, a payment of 1/50th of the standard weekly wage for each week worked.

Bruce Peebles & Co., Ltd., are closing their works from Friday evening, July 8th, to Monday morning, July 18th.

Orders Recently Booked

In reporting an important street-lighting contract secured by the Metropolitan-Vickers Electrical Co., in conjunction with the Wardle Engineering Co., in our issue of June 10th, we omitted to say that the contract was for Bingley, Yorks. Fluorescent lamps (120-400 W) are being employed.

Trade Announcements

L. G. Hawkins & Co., Ltd., announce that while all correspondence and orders should continue to be sent to 30-35, Drury Lane, W.C.2, all returns, repairs, &c., should be addressed to the company at Tileyard Road, York Way, King's Cross, London, N.7.

Mr. I. T. Watkins, Midland representative of the Westinghouse Brake & Signal Co., Ltd., has removed to 32, Benson Road, Maypole Road, King's Heath, Birmingham, 19. The telephone number is Warstock 2158.

The telephone number of the Westinghouse Brake & Signal Co.'s northern representative, Mr. W. E. Wilkins, has been changed to Ringway 3491.

Thomas & Son (Worcester), Ltd., announce a reduction in the price of their "Climax" domestic-type shallow well electric piston pumps and the inclusion of a starter.

Ozonair, Ltd., announces that owing to renaming streets its address from July 1st will be Longmoore Street, S.W.1.

F. G. Ride & Co. have moved to Ridelec House, 72, Gartside Street, Manchester. The telephone numbers are unaltered.

To meet the increasing demand for "B-W" products Barlow-Whitney, Ltd., have moved to larger premises at Coombe Road, Neasden Lane, N.W.10 (telephone: Gladstone 1152 and 1153).

Murex Welding Processes, Ltd., have moved to new offices and works at Hertford Road, Waltham Cross, Herts (Telephone: Waltham Cross 1050).

Crompton Parkinson, Ltd., advise us that as a result of the continued increase in business conducted by their Manchester plant sales office larger premises are being taken at Blackfriars House, Parsonage, Manchester, 3, as from June 22nd.

The telephone numbers will remain the same (Blackfriars 6212-4), as also will the arrangements covering the lamp and cable departments, which will continue to operate from Northern House, 7, Gartside Street, Manchester.

Fredk. Thomas & Co., Ltd., ask us to state that the fire which recently occurred in one of their stores has not interfered with manufacturing and deliveries.

Social Events

A sports meeting between the North Eastern Electric Supply Co., Ltd., and the Yorkshire Electric Power Co. was held on June 11th on the grounds of the Otley Mills Club. The teams were entertained to lunch and Mr. W. B. Woodhouse, managing director of the Y.E.P. Co., welcomed the visitors, Lt.-Col. S. E. Monkhouse, general manager of the N.E.S. Co., replying. The Y.E.P. Co. won the cricket, tennis and bowls contests, while the N.E.S. Co. won the shooting and golf.

Besides a golf competition and a bowls match between the South Wales Electric Power Co. and the Shropshire, Worcestershire & Staffordshire Electric Power Co., and golf competition between the S.W.P. and Edmundsons Electricity Corporation, Ltd., a cup presented by Mr. H. S. Ellis, general manager, West Gloucester Power Co., and Mrs. Ellis, was competed for on the tennis courts in the grounds of the Sedbury Park Hotel, overlooking the Severn, on June 12th. Mr. C. T. Allan, assistant manager of the S.W.P. Co., brought a team of eight to meet a similar number of the W.G. Co. The result of play was very close, the W.G. Co. winning by 141 games to 136 (9 events to 7).

Effective lighting at the Queen Anne Restaurant, Cheapside, London
[Elec. Rev. photo.

Coun. F. Holmes (chairman of the Hull Electricity Committee) and Mr. J. N. Waite, general manager of the undertaking, were among those present at the tenth annual sports held by the Hull Electricity Department on Saturday last on the Recreation Ground, Hessle. The prizes were presented by Mrs. J. N. Waite.

The Automatic Telephone & Electric Co., Ltd., and its associated company, Elexcel, Ltd., held their annual sports at the White City Stadium, Liverpool, on June 11th. The "Gann" trophy for the champion department was won by a group composed of the general office, cost, sales, installation, publicity licity and purchasing departments.

On Saturday last the first annual sports day of the Wessex Electricity Co. and associated companies (South Western group) was held at Victoria Park, Newbury. There was a large entry for the long list of events (about forty) which provided some exciting finishes. At the conclusion of the races the prizes were presented by Mr. W. E. Brandreth.

Price of Materials

Henry Gardner & Co., Ltd., report, June 22nd: Copper bars (best selected), sheet and rod, no change. English pig lead, £16, 15s. increase. Spelter, £13, 12s. 6d. increase. English block tin, £184 5s., £14 5s. increase. Mercury, no change.

Frederick Smith & Co. report, June 22nd: Electrolytic copper bars, £39 15s., 5s. increase. Ditto, ditto, wire rods, £44 5s., 5s. increase. Ditto, ditto, h.c. wire, no change. Silicium bronze wire, no change.

Edward Till & Co. report, June 22nd: India rubber, Para fine, no change.

A Halifax Tableau

The Halifax Electricity Department (engineer and manager, Mr. G. A. Vowles) had an entry in the recent Royal Halifax Infirmary annual gala procession, and secured the second prize. The exhibit consisted of a wagon representing a small kitchen equipped with an electric cooker, water heater, kettle and vacuum cleaner. An added novelty was the Department's cable drum float. The drum was coated with aluminium paint and the whole made a very effective display.

The prize-winning Halifax display

A.R.P. and Cable Repairs

However well protected power stations and sub-stations may be from attack by aircraft, the supply of electricity over wide areas might be seriously affected by damage caused by bombs to cables. Callender's Cable and Construction Co., Ltd., has developed an organisation for dealing with emergencies of this kind throughout the country. In addition to the fault-locating apparatus and portable generators, which together with a skilled staff are available in all districts, air compressors for use in excavating the ground are provided mounted on lorries. One of the special vans contains a 150-kVA d.c. testing set with generator and all ancillary apparatus. In the London area there is also a fleet of mobile "oil stations" containing the plant required for the repair of oil-filled cables.

Fusion of Engineering Interests

The Adamson-Alliance Co., Ltd., 165, Fenchurch Street, London, E.C.3, has been formed for the purpose of combining the sales and manufacturing organisations of the steelworks equipment divisions of Joseph Adamson & Co., Ltd., of Hyde, Cheshire, and the Alliance Machine Co., of Alliance, Ohio, U.S.A.

New E.C.A. Members

At a recent meeting of the E.C.A. Council the following contractors were admitted to full membership:—H. V. Stone & Co., 39, Spring Street, W.2; G. Harding & Sons, Cambridge; H. S. York, Stone, Staffs; D. L. Moss, Upper Gornal, Dudley; H. Elliott, Clitheroe; Walter Robinson, Brighouse, near Huddersfield; and Herbert C. Atkins, Ltd., Nottingham.

The following contractors were admitted to associate membership:—F. Greathead, Cambridge; E. W. Haynes, Trumpington, Cambridge; F. W. G. Rumble, Cambridge; A. F. Rundle, Mevagissey; Ferris Bros., Swindon; Lisburne Electric Co., Torquay; and J. Clarke, Tipton, Staffs.

New Catalogues and Lists

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, London, W.C.2.—A leaflet relating to a new commercial oven type toaster.

H. J. Scott & Co., Ltd., Volt Works, Ravenhill Avenue, Belfast.—A stock list of electric motors.

Newman Industries, Ltd., Yate, near Bristol.—A well illustrated art booklet, dealing with a new range of totally enclosed a.c. air blast self-cooled motors.

Mortimer Gall Electrical Centre, 115/117, Cannon Street, London, E.C.4.—A catalogue of fans, fan heaters, &c.

Ferranti, Ltd., Hollinwood.—New lists relating to electromagnetic relays, field protective relays, 2-in. dial instruments, summation meters and instrument transformers.

British Insulated Cables, Ltd., Prescot. Details of plastic "Pernax" tape, tramway and trolley-bus line fittings and current collectors.

Union Lamp & Lighting Co., Ltd., Abbeydale Road, Wembley.—A price list of architectural lamps.

A display of "Crown Merton" aluminium ware (Corfield-Sigg, Ltd.) arranged recently at the showrooms of the Aldershot Corporation Electricity Department

J. H. Holmes & Co., Ltd., Hebburn-on-Tyne.—A pamphlet relating to variable speed a.c. motors.

Concrete Utilities, Ltd., Great Amwell, Ware.—An art booklet illustrating installations of concrete lamp columns and containing technical specifications.

Allen West & Co., Ltd., Brighton.—A leaflet relating to the "O.B." switchgear built to B.S.S. 116-1937.

F. W. Leichner & Co., Ltd., 5, Fairfax Road, London, N.W.6.—A 35-page catalogue of "Kabi" switches and potentiometers.

Hopkinsons, Ltd., Huddersfield.—A pamphlet relating to the "Hopkinson" steam distributor.

Mallinson & Eckersley, Ltd., Worsley Street, New Bailey Street, Salford, Manchester, 3.—A leaflet dealing with solid turned table lamps.

Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester.—Details of a small inspection lamp for high or low voltages.

Aron Electricity Meter, Ltd., 72-82, Salusbury Road, Kilburn, London, N.W.6.—Details of a new kVA m.d. indicator.

Reduction of Capital

The High Court has confirmed the reduction of the capital of Scarrs, Ltd., from £75,000 to £64,600.

Private Arrangements

H. Dumbell, trading as J. D. Wireless Co., 191 and 195, Breck Road, Liverpool, and elsewhere.—A meeting of the creditors was held recently when a statement of affairs was submitted showing liabilities of £2,086, of which £1,886 was due to the trade and £200 to cash creditors. In addition, there were fully secured creditors for £6,179. The net assets were £2,235, leaving a surplus of £148. A resolution was passed in favour of the estate being administered under a deed of assignment to Mr. J. Airey, Liverpool, and Mr. P. W. Ardran, Liverpool, as joint trustees. A committee of the three principal creditors was also appointed.

M. J. Frayne, electrical engineer, 4, Trinity Street, Dublin.—The creditors were called together recently when a balance sheet was submitted showing liabilities of £1,628 and assets of £1,421, leaving a debit balance of £207. An offer was submitted of a composition of 3s. 4d. in the £, payable as to 1s. 4d. in cash and the balance by two equal instalments on October 1st, 1938, and January 1st, 1939, the last two instalments being secured. It was stated that during the last year the turnover had been £4,500. A resolution was passed agreeing to accept the offer.

Bankruptcy Proceedings

J. H. Metcalf, 82, Clivedon Avenue, Perry Barr, lately residing and carrying on business at 261, High Street, Smethwick, and carrying on business lately at 171, Summer Lane, Birmingham.—Last day for receiving proofs for dividend June 25th. Trustee, Mr. R. K. Clark, 159, Great Charles Street, Birmingham, Official Receiver.

F. W. Hirst, lately 1, Newlands Buildings, Marton Road, Middlesbrough, Yorkshire, radio dealer.—The public examination was held at the Court House, Middlesbrough, on June 17th. Debtor's statement of affairs showed gross liabilities of £985 and a deficiency of £335. The examination was adjourned.

F. Arrowsmith, 34, Great Moor Street, Bolton; 6, Bolton Street, Bury; 142, Blackburn Road, Accrington, and 8, Darwen Street Blackburn, radio dealer.—At the public examination held at the Court House, Mawdsley Street, Bolton, on June 14th it was stated that the gross liabilities were £4,472, of which £2,398 was due to unsecured creditors, and there was a deficiency of £875. Debtor attributed his present position partly to lack of capital. He asserted that he made every shop pay, and that his losses had arisen within the last three months. He sold goods on credit and had a number of book debts. He was ordered to supply a list of those debts, and the examination was adjourned.

W. H. McMillan, 21, Allport Lane, Bromborough, radio dealer.—The public examination was held at the Court House, Pilgrim Street, Birkenhead, on June 15th. It was reported that the unsecured liabilities amounted to £1,077, and there were estimated net assets of £332, leaving a deficiency of £745. The examination was adjourned.

R. J. Horton, electrical engineer, 204, Coldharbour Lane, Brixton, and lately of 308, Brighton Road, South Croydon, and 25, Chipstead Valley Road, Coulsdon.—This debtor's application for discharge came before Mr. Registrar Kean last week at the London Bankruptcy Court. Mr. H. H. Gaine, Official Receiver, reported that the debtor petitioned the Court last October with provable debts of £2,380; the assets valued at £676 had realised £266, and Mr. Charles Latham, the trustee, expected to pay a dividend of between 2s. and 2s. 6d. in the £. The discharge was suspended for twelve months.

A. F. Peacock, 15, Bank Street, Teignmouth, radio engineer.—A deficiency of £934 was disclosed at the public examination of this debtor held recently at the County Court Offices, Castle Chambers, Union Street, Torquay. Debtor attributed his failure to commencing on borrowed capital, heavy overhead expenses and running of car, &c., insufficient capital, which prevented him from buying on the best terms to ensure reasonable profits, and depression in the radio business. The examination was closed.

G. L. Branford, radio and electrical engineer, 68, Margate Road, Ramsgate.—Trustee, Mr. F. C. Wells, 1, The Parade, Canterbury, Official Receiver, released June 1st.

C. E. Moore, wireless engineer, trading as C. E. Moore & Co., 35, High Street, St. Neots.—Particulars of claims by July 2nd to trustee, Mr. A. H. Ward, Official Receiver, 41, Sidney Street, Cambridge.

C. G. Merrison, radio dealer, 61b, Raleigh Street, Walsall.—Public examination July 22nd at the Court House, Walsall.

E. Nelson (E. Nelson & Son), electrician, 63, Wharton Street, South Shields.—Last day for receiving proofs for dividend June 29th. Trustee, Mr. P. J. McLellan, 81, St. Mary's Place, Newcastle-on-Tyne, Official Receiver.

F. Hudson, radio dealer, 178, Blackburn Road, Accrington.—First and final dividend of 1s. 7d. in the £ payable June 24th at 7, Lord Street West, Blackburn.

Company Liquidations

Ashton Electrical Co. (Preston), Ltd., electrical engineers and contractors, 8, Tulketh Brow, and 190, Fylde Road, Preston. The statutory meeting of creditors was held recently at the Chartered Accountants Hall, Spring Gardens, Manchester. The statement of affairs disclosed ranking liabilities of £5,732, of which £5,253 was due to the trade and £479 to cash creditors. In addition there were fully secured creditors for £1,748. The net assets were £3,249, leaving a deficiency, as regarded the creditors, of £2,483. It was stated that there were also contingent liabilities in respect of customers' acceptances discounted and other claims under hire-purchase transactions, including servicing, &c., the exact amount of which could not yet be ascertained. With regard to the balance due to the receiver there was a debenture for £2,404, and the receiver's liabilities were £180, making a total of £2,584, while the receiver had cash in hand amounting to £2,303. The company had an issued capital of £3,883, and as regarded the shareholders there was a deficiency of £6,366. It was reported that the debenture holder appointed a receiver on January 5th last. Efforts had been made to dispose of the business as a going concern but without success. The shareholders had passed the usual resolution putting the company into voluntary liquidation, with Mr. F. E. Bendall, 31, Lloyd Street, Manchester, and Mr. A. E. Attwood, Balfour House, Finsbury Pavement, London, E.C.2, as joint liquidators, with a committee of inspection.

Automobile and Home Radio, Ltd.—Particulars of claims by July 8th to the liquidator, Mr. A. C. Lucas, Brettenham House, Lancaster Place, Strand, W.C.2. (This notice is purely formal, as all creditors have been, or will be, paid in full.) Meeting July 13th at Brettenham House to receive an account of the winding-up by the liquidator.

Central London Electricity Distribution Committee, 1934, Ltd.—Meeting July 11th at 11, Maiden Lane, W.C.2, to receive an account of the winding-up by the liquidator, Mr. F. Wood. (This Committee prepared the scheme which resulted in the formation of London Associated Electricity Undertakings, Ltd.)

E. A. Devine, Ltd.—Winding up voluntarily. Liquidator, Mr. E. Sparks, 25, Bondgate Without, Alnwick.

G. W. Cross & Co., Ltd.—Winding up voluntarily. Liquidator, Mr. W. O. R. Head, Pinners Hall, Austin Friars, E.C.2.

J. Harry Hunt, Ltd.—Winding up voluntarily. Liquidator, Mr. A. Cripwell, 12, Cherry Street, Birmingham.

Porlock and District Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, the Hon. H. N. Morgan-Grenville, 53, Parliament Street, S.W.1.

Cirencester Electric Supply Co., Ltd.—Meeting July 18th at the offices of Edmundsons' Electricity Corporation, Ltd., Thames House, Millbank, S.W.1, to receive an account of the winding up by the liquidator, Mr. E. J. Harrison.

Electric Super Service Co., Ltd.—Meeting July 18th at 30, College Street, Dowgate Hill, London, to receive an account of the winding up by the liquidator, Mr. J. B. Belcher.

J. Wrides Radio Depot, Ltd.—Meeting July 29th at the offices of Poppleton & Appleby, 31, Lloyd Street, Manchester, to receive an account of the winding up by the liquidators, Messrs. N. W. Peeling and F. E. Bendall.

Radio & Electrical Supplies (Western), Ltd.—Meeting July 18th at 28, Rutland Street, Swansea, to receive an account of the winding up by the liquidator, Mr. G. M. Davies.

Tubelight Sales, Ltd.—Winding up voluntarily. Liquidator, Mr. W. E. Ridsdale, 4, London Wall Avenue, London, E.C.2.

W. G. Pearson & Sons, Ltd.—Winding up voluntarily. Particulars of claims to the liquidator, Mr. H. Cashman, 475, Barking Road, Plaistow, E.13, by July 5th.

Telsen Electric Co., Ltd.—Third and final dividend of 1s. 2½d. in the £ payable June 27th at the office of the liquidator, 185-188, High Holborn, W.C.1.

Electricity Supply

Lighting, Domestic, Power

Bedford.—EXTENSIONS.—The Electricity Committee is to extend the mains to Goldington at a cost of £480, and to Lidlington (£323).

Brierfield.—LIGHTING INSTALLATION.—An installation of sodium lamps is being carried through. The scheme will subsequently apply to the whole of the main Burnley-Colne Road, Brierfield. Following reports from the gas and electrical engineers, the Council has decided that in future developments of public lighting, preference shall be given to the use of electricity.

Brighton.—SUPPLY TO ESTATE.—The Electricity Committee is to provide mains and a sub-station at a cost of £4,753 for an electricity supply to 170 houses to be erected by the Corporation in Carden Avenue.

Broomfleet (Yorks).—SUPPLY INAUGURATED.—An electricity supply in the village was switched on at the beginning of the month, and the oil lamps have now been superseded by electricity for public lighting.

Burton-upon-Trent.—ENGINEER'S REPORT.—Reviewing the past year's operations of the Electricity Department, the borough electrical engineer (Mr. T. Hall) draws attention to an increase of 29 per cent., or nearly two million kWh, in "all-in" tariff sales. The number of domestic cookers and water heaters, etc., connected exceeded that in any previous year, and the engineer states that there is undoubtedly a large field for development of the use of electricity in the home. Power consumption increased by 9 per cent. to 29.8 million kWh, and the overall expansion in sales was 12 per cent., bringing the total to 46.1 million kWh. The bulk supply to Uttoxeter rose by 25 per cent. to 2.9 million kWh, and further improvement should follow the recent reductions in charges there. Other statistics contained in the report are as follows: Consumers, 23,946 (an increase of 1,157); connected load, 55,892 kW (an addition of 6,769 kW); and net profit on the year's working, £16,162 (against £19,606 in the previous year).

Canterbury.—STREET LIGHTING.—The Corporation is to install mercury electric-discharge lighting in Rhodans Town, Upper Bridge Street, Lower Bridge Street, and Broad Street.

Cardiff.—SUB-STATIONS.—The Electricity Committee is to erect new sub-stations at a cost of £3,580 and extend others at a cost of £1,614.

Carlisle.—SUPPLY EXTENSION.—The Electricity Committee is to provide a supply to Riggfoot, Hallshill and Boltonfellend, and Rockcliffe Cross at a cost of £1.967. A loan of £2,903 has been sanctioned in connection with the extension of the supply to Gaitle Bridge, Blackbank and Scotby.

METERS.—Application is to be made for sanction to borrow £8,000 for meters.

UNDERTAKING'S PROGRESS.—The City Council's electricity undertaking earned a surplus of £6,622 during the year ended March 31st. Presenting the annual report at a meeting of the City Council Mr. J. R. Potts (chairman, Electricity Committee) said they had extended their activities very considerably during the past year. Although they had a large area to develop they had been able to keep their prices down. During the past four or five years they had conceded about £4,000 to consumers in the way of price reductions. In his report the city electrical engineer and manager (Mr. C. W. Salt) shows that the total length of mains added during the year was 47 miles (38 miles in the rural area). The sales of energy rose by 11 per cent. to 28.1 million kWh, there being an increase of 33 per cent. to 5.4 million kWh in the rural area.

Chester.—BETTER LIGHTING.—The Town Council has approved a scheme for improving the electric lighting in various roads.

Cornforth (Co. Durham).—STREET LIGHTING.—The Parish Council is to extend the electric street lighting system to the West Cornforth and Stobb Cross Farm estates.

Dorchester.—EXTENSION.—The Mill Street Housing Society's estate is to be supplied with electricity by the Corporation at a cost of £180.

Droxford.—OVERHEAD LINES.—The West Hampshire Electricity Co., Ltd., proposes to erect overhead lines at Darby and Upham.

East Grinstead (Sussex).—LIGHTING IMPROVEMENTS.—The Urban District Council proposes to improve the lighting along the London-Eastbourne road.

Ferring (Sussex).—STREET LIGHTING.—A street-lighting scheme has been approved by the Parish Council, which proposes to use sodium lamps. The scheme will be placed before a parish meeting.

Glendale (Northumberland). — EXTENSION. — The Scottish Southern Electric Supply Co., Ltd., is to extend its transmission line to Mindrum, Mindrum Mill and Venchan.

Great Yarmouth.—METER TESTING.—Designed to conform with the Electricity (Meters) Act, a meter testing station is under construction at Electric House, Yarmouth. It will be capable of testing and calibrating up to 10,000 meters per annum.

POWER STATION IMPROVEMENTS.—At the power station, a new control room with bomb-splinter-proof roof is being constructed to house, eventually, apparatus for operating all the main generator, transformer and feeder switches by remote or push-button control. Direct telephone communication will be established with the Central Electricity Board and the power station superintendent.

Grimsby.—PROPOSED SUPPLY EXTENSION.—Negotiations between the Electricity Department and the Air Ministry regarding a proposed electricity supply to a wireless transmitting station at Stenigot have made considerable progress, and an agreement is anticipated in the near future. At first the Air Ministry will require a supply of approximately 70 kW. Villages along the route of the proposed transmission line will also be canvassed with a view to supplying them with electricity.

Hadleigh (Suffolk).—STREET LIGHTING.—Members of the Urban District Council are to visit towns and villages lighted by electricity before it is decided whether the streets shall be lighted by electricity or gas. Tenders have been received from both the East Anglian Electric Supply Co., Ltd., and from the Hadleigh Gas Consumers' Co., Ltd. The streets have been lighted by gas for the past fifty years.

Hamilton.—BULK SUPPLY TARIFF.—An increase of about 20 per cent. has been made in the Clyde Valley Electrical Power Co.'s tariff for bulk supply to the Corporation.

Hayes & Harlington.—BATH ROAD LIGHTING.—Concrete Utilities, Ltd., referring to our last week's note upon this installation, tell us that their standards were used for mounting the lamps. The company has developed a concrete standard with self-contained lowering equipment, the winch being housed in the base of the column.

Hazel Grove.—DOMESTIC APPLIANCES.—Application is being made by the Urban District Council for sanction to borrow £20,000 for the purchase of domestic appliances.

Ilford.—APPARATUS ON HIRE.—Permission is being sought by the Town Council to borrow £20,000 for electrical apparatus for hire.

Irthlingborough (Northants). — STREET LIGHTING. — The Urban District Council has now entered into an agreement with the Rushden Electric Supply Co., Ltd., for street lighting for a further seven years, at £556 per annum. The new contract contains an extension of the lighting period.

London.—ISLINGTON.—The Electricity Committee has had reports from the borough treasurer and borough electrical engineer upon the increased working costs of the electricity undertaking due to the increase in the cost of production, and considers that an additional charge of 3½ per cent. should be made on all prices for private supply.

Middleton.—ELECTRIC-DISCHARGE LIGHTING.—Extensions are to be carried out to the mercury electric-discharge lighting in Oldham Road.

North Wales.—RURAL SUPPLY OBSTACLES.—Opposition by county and local authorities to overhead lines and the difficulty of obtaining wayleaves were stated at the annual meeting of the North Wales and South Cheshire Joint Electricity Authority, at Llandudno, to be the main causes of delay in proceeding with rural electrification. Mr. G. K. Paton (North Wales Power Co.) said that, as soon as it became known that the company proposed taking a supply to Bettws-y-coed, the Llanrwst Council passed a resolution strongly objecting to overhead wires or poles. Many areas were enjoying cheap electricity because the supplies were conveyed by overhead lines. One particular extension in Anglesey had been held up for eighteen months by local opposition. It was decided that a suitable resolution should be framed and brought before the next meeting, and that, in the meantime, copies of the memorandum on rural electrification should be circulated among the local authorities. A letter from the Electricity Commissoners asked whether the Joint Authority had any observations to offer on the application by the North Wales Power Co. for the transfer to the company of the Bettws-y-Coed electricity undertaking. Mr. James Rankin, secretary of the company, said he could disclose the purchase figures, but would be in the difficult position of doing so without the permission of the Bettws-y-Coed Council. It was decided to communicate with the Council asking for information regarding the terms of purchases. Councillor Arthur Hewitt, of Llandudno, was re-elected chairman. He has been a member of the authority since its inception and chairman for fifteen years.

Norwich.—ELECTRICITY FOR MARKET.—The Markets Committee is to install electricity at the market at a cost of £1,680.

Nottinghamshire.—CHANGE FROM GAS TO ELECTRICITY.—At the expiration of the present contract with the Riddings Gas Co. the Selston Parish Council has decided that electricity shall be used for street lighting. Arrangements are also being made for a change from gas to electricity for street lighting in the parishes of Brinsley, Burton Joyce, Cossall, Kimberley, Bestwood, Linby and Ruddington. The Basford Rural District Council has indicated that it is favourable to the conversion.

Redcar.—CABLE.—The Electricity Committee is to lay another feeder cable to the Kirkleatham Lane housing estate.

Ripponden.—SODIUM LIGHTING.—Gas lighting in the centre of Ripponden is to be superseded by sodium electric-discharge

lighting, the Council having accepted a tender of the Electrical Distribution of Yorkshire, Ltd., for twenty-two lamps.

Ramsey (Hunts).—ELECTRIC STREET LIGHTING.—Having considered tenders for street lighting from the B. C. & H. Electricity Co. and the local gas company, the Urban District Council has decided to light the streets with electricity.

Rugby.—ELECTRIC PUMPING PLANT.—Electrically driven pumps are to be installed at the waterworks at an estimated cost of £5,280. Tenders are to be invited.

MAINS.—The Town Council proposes to reorganise the low voltage system in Oxford Street at a cost of £1,744.

Ruthin.—ELECTRICAL DEVELOPMENTS.—About £6,500 is to be spent by the Borough Council on the town's electricity supply. An agreement is to be made with the North Wales Power Co. for a bulk supply of electricity, and a change over to a.c. is to be effected. The undertaking was acquired by the Council two years ago.

Stoke-on-Trent.—CHANGE-OVER.—Consumers' installations in the High Street area of Longton are to be changed over to a.c. at a cost of £7,500.

MAINS.—At a cost of £3,315 the Electricity Committee is to extend the mains to the New House farm estate, Bucknall.

Swansea.—SUB-STATION.—The Electricity Committee is to erect a sub-station in connection with the supply to premises being erected at Landore for Imperial Chemical Industries, Ltd.

Swindon.—SUPPLY IMPROVEMENTS.—The Electricity Committee is to provide a supply to Purton Road, Moredon, the cost being £200.

Uxbridge.—LIGHTING OF COUNCIL HOUSES.—The Urban District Council proposes to have electric light installed in 860 Council houses.

Watford.—REWIRING SCHEME.—The Hertfordshire County Council is to rewire the electrical installation at the Ashby Road Children's Homes at a cost of about £250.

Wellingborough.—OVERHEAD LINES.—Richard Thomas & Co., Ltd., are to erect an 11,000-V overhead line from their Irthlingborough mines to open-cast workings west of Finedon.

Wrexham.—REVISED TARIFF.—The Electricity Distribution of North Wales announces the following revised charges for the Wrexham area under the residential tariff, to apply to all meter readings from July 1st:—4s. per assessable room per quarter and a "unit" charge of 1¼d. up to 50 kWh per quarter and ¾d. thereafter.

Traction

London.—COLLISION INQUIRY RESULT.—Col. A. C. Trench's findings as a result of the Ministry of Transport inquiry into the circumstances of the collision on the Northern Underground Line between Waterloo and Charing Cross on March 10th have now been published. The primary responsibility is placed on Lineman Hardy, who was called to investigate an intermittent signal failure. In carrying out a temporary repair he shortened the clearing distance of the block section from 615 yd. to 33 yd. He realised that he had shortened the distance, but not so seriously. No doubt he was actuated by a desire to minimise traffic delay at the peak period, and his position was rendered more difficult by the fact that his recent transfer to the adjoining area had not given him time to study the signalling in the neighbouring areas to which he might be called in an emergency. Col. Trench adds that he would have expected one or other of the responsible members of the traffic staff present to have ascertained the general position sufficiently to have taken charge of the traffic movement. With regard to the delay in releasing passengers from the two trains which was altogether excessive, causing extreme discomfort, there was an unfortunate combination of adverse circumstances, in respect of which various recommendations are contained in the report.

Poland.—ELECTRIFICATION OF METROPOLITAN RAILWAYS.—The Government is raising a loan abroad in order to carry out the second stage of a scheme to electrify all railways between the capital and suburbs and cities within a range of about twenty-five miles. The first stage, the contract for which was secured by the English Electric Co. and the Metropolitan-Vickers Electrical Export Co., was completed recently, comprising the electrification of the Warsaw-Otwock line (27 km), the Warsaw-Zydardow line (43 km) and the Warsaw-Minsk Mazowiecki line (40 km). The second stage, for which capital is now being sought, will involve an outlay of about 30 million zlotys. It provides for electrification of the Lowicz-Blonie, Mlawa-Modlin, Bialystok-Tluszcz and Radom-Warka lines.

Southern Railway.—NEWLY ELECTRIFIED LINES.—The official inauguration of the electrified services from Dorking North to Ford Junction, West Worthing to Havant, the Littlehampton and Bognor Regis branches and the link from Three Bridges to Horsham will take place on Thursday next. A special train from Victoria will travel by way of Horsham and Arundel to Chichester, returning to Littlehampton, where there will be a reception by the Urban District Council. The guests will then go on to Bognor, where the Urban District Council will entertain them to lunch at the Pavilion. On the return journey calls will be made at Chichester, Arundel and Horsham.

Sweden.—NEW RAILWAY ELECTRIFICATION.—Three private railway companies in the Göteborg region have embarked on new electrification schemes the cost of which is 18 million kronor, or more than £900,000. By the end of next year, 318 km of railway lines will thus be converted to electric traction. The biggest undertaking is the electrification of the Göteborg-Amal line (164 km) operated by the Bergslags Jarnvags A-B, the two other lines being operated by the Bohusbanan and by Dalslands Jarnvags A-B, namely the Mellerud-Kornsjo line (65 km) and the Göteborg-Uddevalla line (89 km), respectively.

FIRST TROLLEY-BUSES IN SWEDEN.—Göteborg will be the first city in Sweden to have a trolley-bus service, an initial allocation of 500,00 kr. having been made for the purpose. The service to be displaced is at present operated by motor-buses.

Communications

Scandinavia.—RADIO RELAYS.—Extensive experiments are being carried out in Sweden with the relaying of broadcast entertainment over telephone and high-voltage networks. An experimental relay system has been tried out with great success at Karlshamn, and a similar but much larger system is to be provided in the capital, Stockholm. In the latter case it is proposed to radiate alternative programmes.

CENTRAL SHORT-WAVE TRANSMITTER.—A joint Scandinavian committee appointed to inquire into the short-wave broadcasting situation recommends the erection of a transmitter on a central site near Göteborg. Operating with an aerial output of not less than 20 kW, this new station would be used to act as a "voice of Scandinavia" and would be controlled by Denmark, Norway, Finland and Sweden. The advent of the new station would not affect individual s.w. broadcasting schemes or the existing national s.w. transmitters.

SHIP'S RADIO EQUIPMENT.—A meeting of Norwegian shipping men was called recently to discuss the future of wireless communication. It was stated that in order to be up to new international standards, Norway would have to renew at least 50 per cent. of present wireless installations in merchant ships within two years. The number of radio-equipped Norwegian merchant ships has risen to 1,127, according to the latest survey. Short-wave communication is becoming very popular in Scandinavian shipping.

NEW TRANSMITTER.—At a recent meeting of the Norwegian Cabinet it was decided to grant 1.4 million kr. towards the cost of erecting a new 100-kW broadcasting station, for which a suitable site has yet to be found.

TELEPHONE CONFERENCE AT OSLO.—A *Reuter* message states that an International conference of representatives of all the telephone authorities in Europe is meeting in Oslo to discuss various problems connected with the International telephone service. The conference will last until July 2nd.

Switzerland.—U.I.R. SUMMER MEETING.—The International Broadcasting Union (U.I.R.), which has as its members most of the broadcasting services of Europe and overseas, is now holding its annual summer meeting at Ouchy (Lausanne) under the presidency of Monsieur A. Dubois (Holland). This meeting is of particular interest because the business transacted will include a preliminary examination of the European wavelength plan in the light of the decisions of the World Conference on Telecommunications, which was held at Cairo in February and March this year. The meeting at Ouchy will consider an examination of the position by the Technical Committee under the presidency of Monsieur Raymond Braillard (Brussels). The final proposals of the U.I.R. to the European governments will be formulated at the next meeting which will take place in the autumn. The B.B.C. is represented at the meeting, which is expected to end on July 2nd, by Sir Noel Ashbridge and Messrs. L. W. Hayes, R. D'A. Marriott, C. F. Atkinson and R. Jardine Brown.

Power Companies and Aluminium Production

(From a Tokyo Correspondent)

IN conformity with the Japanese Government's policy of expansion to meet war-time requirements, and apparently also in an attempt to enlarge its business activities in view of the partial national management of the electric power industry, the Tokyo Electric Light Co. has formulated a plan to organise an aluminium company with a capital of 100,000,000 yen, in which it is aided by the Furnkawa Electrical Engineering Co. and other interests. It is understood that the Tokyo company will take charge of the power generating department and the Furukawa company of the refining department. Under the present plan the new company will produce 25,000 metric tons of aluminium during the first year of operations, and its productive capacity will be expanded to 50,000 tons. The electric power load will be in the neighbourhood of 150,000 kW. This move is considered significant in that it indicates the tendency of electric power companies in Japan to shift their business, to a very considerable extent, to the chemical industry, as a result of the passage through the Imperial Diet of the Electric Power Nationalisation Law. A report from Hsinking also indicates that the Manchou Light Metal Co. has reached a decision to increase the annual production capacity of its Fushun aluminium plant from 4,000 to 10,000 metric tons, and also to establish a new plant capable of producing 20,000 tons at Antung in line with the revised five-year industrial plan of the Manchukuo Government.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Argentina.—BUENOS AIRES.—August 22nd. National Sanitation Works Department. Six electric pumping sets, accessories and spares. (T.Y.23107/38.)*

Aylesbury.—June 27th. Electricity Department. 33-kV, three-phase overhead transmission line. (June 17th.)

Barking.—June 27th. Corporation. Electrical installations for Scratton's Farm housing estate. (June 10th.)
July 4th. Electrical installations for Gascoigne School. (June 10th.)

Bexhill.—July 5th. Electricity Department. Meter-testing equipment and instruments. (See this issue.)

Bolton.—July 14th. Electricity Department. Erection of a circular brick chimney at the Back o' th' Bank generating station. (June 10th.)

Bridport.—July 13th. Electricity Department. 6,600-V overhead lines, together with a section of 230/400-V lines. (See this issue.)

Bristol.—July 11th. Electricity Department. 6,600-V transformer and l.v. feeder voltage regulators. (See this issue.)

Cardiff.—July 12th. Education Department. Electrical installation at Colchester Avenue High School for Girls. City electrical engineer, The Hayes (deposit £1 1s.).

Croydon.—July 4th. Electricity Department. Coal-handling and storage plant. (June 10th.)

Derwent.—June 30th. R.D.C. Two electrically driven centrifugal pumps, including motors, for Barlby pumping station. J. Townend, Clerk to the Council, 1, Abbey Place, Selby.

Dewsbury.—July 5th. Electricity Undertaking. One l.v. three-phase sub-station distribution board. (See this issue.)

Dublin.—August 6th. Electricity Supply Board. Four 15,000-kVA transformers with on-load tap-changing equipment. (See this issue.)

Dumfries.—June 25th. Dumfries and Galloway Royal Infirmary. Heating installation and alterations and extensions to electric lighting installation at Limehurst, Dock Park. J. A. Will, secretary and treasurer, 3, Great King Street.

East Grinstead.—June 27th. U.D.C. P.i., lead covered and armoured cables for twelve months. (June 17th.)

Egypt.—CAIRO.—July 18th. Ministry of Public Health. Electro-medical apparatus and accessories. (T.22795/38.)*
July 16th. 300 electricity meters. (T.Y.23368/1938.)*

Exeter.—July 5th. Electricity Department. Fourteen transformers. (June 17th.)

Fife.—July 12th. Education Committee. Electrical installations at eleven schools, schoolhouses, &c. G. Sandilands, county master of works, County Offices, Kirkcaldy (deposit £1 1s.).

Gellygaer.—June 30th. Electricity Department. Electric cookers, wash boilers, kettles, irons, fires, lamps, cables, copper conductors, wiring accessories, meter boards and house service cut-outs for the period ending March 31st, 1939. (June 10th.)

Hastings.—June 27th. Electricity Department. Fire fighting installation for Shepherd Street sub-station, St. Leonards-on-Sea. (June 10th.)

Haswell (Co. DURHAM).—Parish Council. Extension of electric street lighting to Salters Lane. Clerk, Council Office.

Heston and Isleworth.—July 5th. Electricity Department. One 600-kVA transformer and e.h.v. and l.v. cable. (See this issue.)

Horsham.—July 4th. Electricity Department. One steel kiosk transformer sub-station. (See this issue.)

Huddersfield.—June 28th. Electricity Department. Meter-testing equipment. (June 17th.)

India.—SIMLA.—July 7th. Indian Stores Department. Lighting equipment for the Karachi-Bombay air route. (TY.22683/38.)*

Iran.—Ministry of Industry and Mines. Complete turbo-electric power plant, boilers, compressors and other mining material for Zarabe coal mine. (See this issue.)

Lancaster.—June 30th. Committee. Three 75-W steam engines, d.c. generators and control panels for the County Mental Hospital. (June 10th.)

Limerick (Eire).—July 2nd. Vocational Education Committee. Electrical installation at new schools. P. V. Twomey, chief executive officer, Municipal Technical Institute (deposit £5 5s.).

London.—June 27th. Metropolitan Water Board. Stores, including electric lamps for twelve months. The Clerk of the Board, 173, Rosebery Avenue, E.C.1.
June 30th. H.M. Office of Works. Electric lighting tables, standards, switches, lampholders and shades. Controller of Supplies, King Charles Street, S.W.1.

BATTERSEA.—July 1st. Borough Council. One electric lift. Borough surveyor, Town Hall, Lavender Hill.

HAMMERSMITH.—July 4th. Electricity Department. E.h.v. metal-clad switchgear. (See this issue.)

Manchester.—June 29th. Electricity Committee. H.v. and l.v. cables for Stuart Street power station. (June 17th.)

Midlothian.—June 27th. County Council. Electrical work at Gorebridge Public School extension. County architect, 10, Drumsheugh Gardens, Edinburgh, 3.
Electrical work at eight houses at Wilkieston. County architect.

Newcastle-under-Lyme.—July 19th. Highways Committee. 230 lamps, lanterns, fittings and columns for street lighting within the borough. (See this issue.)

New Zealand.—WELLINGTON.—August 23rd. Public Works Department. 1,000-V switchgear. (T.Y.22750/38.)*
August 18th. Posts and Telegraph Department. Hard-drawn copper wire. (T.22703/1938.)*
CHRISTCHURCH.—August 4th. Electricity Department. Fifteen 200-kVA single-phase transformers. (T.Y.23251/38.)*

North Riding.—County Council. Electric lighting installation at the Northallerton Infants', Redcar West Dyke, Redcar Zetland, Salburn and Yarm Council schools. County architect, Northallerton.

Northumberland.—County Council. Electrical installation at the Cramlington Council school. County architect, County Hall, Newcastle.

Nuneaton.—July 6th. Electricity Department. One kiosk sub-station, complete with e.h.v. and l.v. switchgear and one 300-kVA transformer. (See this issue.)

Roxburgh.—July 8th. County Council. Heating and electrical installation at Newtown St. Boswells school. County Clerk, Newtown St. Boswells (deposit 10s. 6d.).

South Africa.—PRETORIA.—July 7th. Union Tender and Supplies Board. One 50-h.p. squirrel-cage motor and one a.c. portable welding set. (T.Y.22931/38.)*
July 14th. Public Works Department. Apparatus for an electric clock system. (T.23183/38.)*
JOHANNESBURG.—July 19th. City Council. One testing transformer and three 75-kVA transformers. (T.Y.23068/38.)*

Southampton.—July 5th. Electricity Department. 11-kV, 5.6-kV and telephone cables. (See this issue.)
June 25th. Meter testing equipment. (June 17th.)

Southend-on-Sea.—July 3th. Corporation. Complete electrical installation at the Municipal Hospital, Rochford. (See this issue.)

Swansea.—Education Committee. Electric lighting and heating installations at the new and old buildings of the Juvenile Instruction Centre. Borough architect, Guildhall (deposit £2).

Uruguay.—MONTEVIDEO.—July 4th. Electricity Supply and Telephones Administration. 6,000 kg. of black insulating tape. (T.Y.22539/38.)*

Wakefield.—June 27th. West Riding County Council. Installation of electric lighting at Huddersfield Royds Hall Grammar school and Maltby Grammar school. Clerk of the County Council, County Hall.

Watford.—Electricity Supply Department. One e.h.v., 6,600-V eight-panel switchboard. (See this issue.)

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*Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Bedford.—Education Committee. Accepted. Electrical installation at Queen's Park school (£288).—Biggleswade Engineering Co.
Electricity Committee. Recommended. Transformer kiosk for Willington (£482).—B.T.H. Co.

Bootle.—Watch Committee. Recommended. Sodium lighting installation in Southport Road (£1,298).—G.E.C.

Brighton.—Electricity Committee. Accepted. Rewinding generator (£655).—Collins Electrical. Switchgear for Coombe Road sub-station (£695).—Allen West & Co.

Coatbridge.—Town Council. Accepted. Electrical installation at new hostel.—A. Finlay.

Coupar Angus (PERTHSHIRE).—Town Council. Accepted. Electric lighting at Hillgarden housing estate (£126).—J. A. Hackney.

Kilwinning (AYRSHIRE).—Town Council. Accepted. Installation of electric lighting at Eglinton Place (£503). J. Jamieson.

London.—Guildhall School Committee. Recommended. Replacement of electrical installation at School of Music (£440).—Bell Bros. & Co. (London).
COUNTY COUNCIL.—Wiring and fittings for electric lighting, &c., in blocks of dwellings at Hurlock Street area, Islington:

	£		£
Ilford Electrical Co. Accepted ...	**860**	W. J. Furse and Co. (London) ...	908
Jacob, White and Co.	877	E. W. Merredew	1,065
Samuel Reed and Sons	886	Fred. L. M. McGhee and Co. ...	1,380
Buchanan and Curwen	907		

Electrical installation at Joyce Green Hospital, Dartford:

	£		£
Troughton and Young. Accepted	**5,994**	Atozed (London)	8,675
Electrical Installations ...	8,170	A. Hawkins and Sons	8,975
Archibald Meckhonik	8,395	Pinching and Walton	10,636
Read and Partners	8,430	Bell Brothers and Co. (London)	10,975
T. Clarke and Co.	8,476	F. H. Wheeler and Co. ...	11,106
Buchanan and Curwen ...	8,550	Berkeley Electrical Engineering Co.	11,210
Samuel Reed and Sons... ...	8,590		
W. J. Furse and Co. (London)	8,620		

Wiring and fittings for electric lighting in three wards and the provision of a new fire alarm system at St. James' Hospital, Balham:

	£		£
City Electrical Co. Accepted ...	**1,220**	Davis Myer and Co.	1,538
Alexander Hawkins and Sons ...	1,398	Carr Brothers	1,559
Pemberton and Sturgess (Great Britain)	1,465	A. J. Hewens and Sons	1,689
Gilham and Jones	1,480	Atozed (London)	1,700
Pinching and Walton	1,485	H. J. Cash and Co.	1,745
Berkeley Electrical Engineering Company	1,532	Blackburn, Starling and Co. ...	1,760
		E. and C. Champion	1,861

Wiring and fittings for the installation of electric lighting, power, &c., in two ward blocks at Grove Park Hospital, Lee:

	£		£
A. J. Hewens and Sons. Accepted	**1,017**	W. J. Furse and Co. (London) ...	1,317
Holliday and Son (Electrical) ...	1,162	T. Clarke and Co.	1,352
Archibald Meckhonik	1,235	Berkeley Electrical Engineering Co.	1,355
Atozed (London)	1,260	W. H. Gaze and Sons	1,376
Buchanan and Curwen	1,285	Ellis and Ward	1,390
Malcolm and Allan (London) ...	1,285	City Electrical Co.	1,434
F. G. Edey and Co.	1,293	Arthur Cozens	1,616
Duncan Watson (Electrical Engineers)	1,313		

Wiring and fittings for electric lighting and power in block C, Fulham Hospital :

	£		£
Read and Partners. Accepted ...	**648**	Francis Polden and Co.	779
Gilham and Jones	681	A. J. Hewens and Sons	855
City Electrical Co.	692	W. H. Gaze and Sons	860
Jacob, White and Co.	698	Buxton and Longley	890
William Steward and Co. ...	754	Collins Electrical	968
F. G. Edey and Co.	760		

Wakefield.—Housing Committee. Accepted. Wiring twenty-seven houses on the Gill Syke estate (£138).—H. Smith.

Warrington.—Electricity Committee. Accepted. Transformers.—Electric Construction Co.

Wellingborough.—Accepted. Electrical installation of 214 houses on the Urban Council's Croyland Road estate (£924).—G. F. Gray.

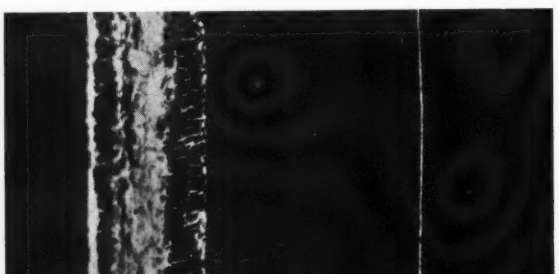
Notes

Under-floor Steel Ducts

For the distribution of electricity within buildings for general, local and desk lighting; G.P.O. and intercommunication telephones, bells, signals; small-power office machines and local heating the under-floor duct system is probably the most comprehensive. Of these services the most important in one respect are the telephone and communication circuits, since they not only add complexity to the wiring arrangements necessary, but by reason of constant alteration in number and position cause continual disturbance to owners and tenants. The B.S.I. has recently issued a British Standard "Under-floor Steel Ducts for Electrical Services with Fittings," and is preparing a similar specification for fibrous ducts. Three systems are provided for; one duct for use where it is intended to use only low-voltage services, such as bells, telephones and signalling equipment; two ducts, one for the above services and the other for high-voltage services, such as lighting and power; and three ducts for use where it is desired to separate the telephones from the signalling equipment. Normally, the two-duct system is satisfactory for the great majority of buildings. The ducts are intended to be laid on the surface of the structural floor and covered by a layer of screed with draw boxes at various points, flush with the finished floor surface. The depth of screed necessary is about 3 in. and allowance must be made accordingly by the architect when planning the building. The new specification, No. 774-1938, may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d.

Invisible Aluminium Wire

In the Canadian Pavilion at the Glasgow Empire Exhibition, on the stand of Aluminium, Ltd., has appeared this week what we take to be the smallest and lightest item to be seen there—to be seen, that is, only through a microscope, as it is invisible to the naked eye. This exhibit is an aluminium



Micro-photographs comparing the diameter of human hair with that of aluminium wire

wire with a diameter of only 0.0001 in., *i.e.*, one six-hundreth the size of the average human hair, and valued at £5 million per oz. Less than 1¼ lb. of it would be required to run round the 24,000-mile circumference of the earth. Fine aluminium wires are used in seismic prospecting, a modern method of finding oil by means of sound detection, on similar lines to the detector used by the Navy to establish the presence of submarines.

Scientific and Technical Books

A second edition of its Select List of Standard British Scientific and Technical Books has been issued by the Association of Special Libraries and Information Bureaux (2s. 6d. to non-subscribers). The number of books listed is 420, including 32 on electrical matters. In a foreword Sir William Bragg refers to the international character of scientific discovery, and points out that at any one moment the work in progress in each country is more or less particular to it. British books, he says, tend to be limited to specialist subjects, few great compendiums being produced in this country as elsewhere. Textbooks relating to science in industry reflect the increasing attention of industry to research. In an introduction, Sir Richard Gregory states that 2,000 new books on scientific subjects are issued annually by British publishers, and that in compiling the present list the aim of the Committee has been to make the most representative books in their various sections known abroad as well at home.

Insulated Boots

A query is raised in the *Industrial Safety Bulletin* as to whether insulated boots are obtainable for the use of melters in steel melting shops where the floor is of steel plate and forms a good electrical earth. While no boot made especially for this purpose appears to be known, it is suggested that trial should be made of clogs without "irons," where there is a risk of electric shock. Alternatively, a rubber composition sole with high resistance to wear might be used, provided assurances are given by the makers as to its reliability at high temperatures.

Vitreous Enamellers

The Institute of Vitreous Enamellers, 42, Napier Court, London, S.W.6, is arranging a visit to the United States (Oct. 1st-26th) for participation in the Porcelain Enamel Institute's third annual conference at the University of Illinois, and to visit manufacturers' enamelling plants in various cities. To save time while in the United States most of the travelling is to be done by air. The cost of the trip will be 110 guineas.

Japanese Rectifier with Mercury Anode

In the *Electrotechnical Journal* of Japan Messrs. Watanabe, Nakumura and Kasahara give some details of a new type of mercury rectifier they have devised. In place of an anode made of graphite or iron, the new type has an anode formed by a sheet of mercury, which, it is claimed, prevents arc formation and arc-return damage to the anode. The authors state that satisfactory tests have been made with a rectifier with a mercury anode with up to 0.58 A at 6,000 V.

A Coal Igniter

An invention which permits the home owner to sit in his living room, press an electric button and thereby light the coal in his heating plant was announced by Mr. Allen J. Johnson to the delegates attending the thirty-sixth annual convention of the New England Coal Dealers' Association. Mr. Johnson, who is a director of the Anthracite Industries Laboratory at Primos, Pennsylvania, where the device was developed, explained that an electric heating element, placed in an automatic anthracite stoker, ignited the coal. An ordinary electric switch sufficed, but the device could also be operated automatically so that if the fire should go out for any reason, it would automatically relight. It had been especially worked out for anthracite stokers and was not yet on the market.

Thirtieth Anniversary of F. & A. Parkinson

A party of more than 1,000 employés at the Guiseley works of Crompton Parkinson, Ltd., with their wives, were entertained to a half-day holiday and outing, on June 17th, to celebrate the thirtieth anniversary of the commencement of the former firm of F. & A. Parkinson, which was amalgamated with Crompton's eleven years ago. At the Golden Acre Pleasure Park, Leeds, Mr. Frank Parkinson and Mr. Albert Parkinson were presented with silver cigarette boxes by the employés as souvenirs of the occasion. During the proceedings long-service badges were presented to about 150 employés, gold watches being given to those who had been with the undertaking for twenty-five years or more. Similar celebrations of the anniversary are being arranged at the London offices and the Chelmsford works.

I.E.E. Conversazione

On Thursday next (June 30th) the annual conversazione of the Institution of Electrical Engineers will be held, as in previous years, at the Natural History Museum, Cromwell Rd., South Kensington, S.W. The President, Sir George Lee, and Miss Margaret Lee will receive the guests between 8.30 and 9.30 p.m.

Appointments Vacant

Borough electrical engineer for Swansea.
Borough electrical engineer for Warrington.
Installation inspector for Reading.
Two meter testers and repairers and assistant for Heston and Isleworth.

(See our classified advertisements.)

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

HALLE boards.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. V. L. Mathias, Warrington borough electrical engineer, is to retire in September after thirty-eight years of municipal service. Born at Bangalore, India, Mr. Mathias was trained at the Central Technical College, South Kensington. He went to Warrington in 1900, as assistant to the borough electrical engineer and tramways manager, and three years later, when the posts were separated, became borough electrical engineer. Mr. Mathias is one of the oldest members of the Institution of Electrical Engineers, chairman of the North-West England and North Wales Centre of E.D.A., chairman of the North-Western Centre of the Associated Municipal Electrical Engineers, and a member of the North-Western Area Whitley District Council and Joint Board. He has been senior vice-chairman of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers. The Town Council is advertising in this issue for a successor to Mr. Mathias at a salary of £1,000 a year.

Mr. Ernest Morgan, M.I.E.E., managing director of the Shropshire, Worcestershire and Staffordshire Electric Power Co., is to be awarded the honorary M.Eng. degree, which will be conferred by the University of Liverpool at St. George's Hall, Liverpool, on July 2nd. A Liverpool man, Mr. Morgan graduated in 1902 at the then University College of Liverpool. For some time he was an engineer with the Wolverhampton Corporation, and subsequently he was appointed city electrical engineer of Sheffield. About three years ago he was appointed to his present position. He is a former chairman of the Midland Centre of the Institution of Electrical Engineers.

Mr. W. G. Hendrey, M.I.E.E., has been appointed a director of Callender's Cable & Construction Co., Ltd.

Mr. B. N. Dunster, who was for many years associated with Bertram Thomas and Switchgear & Cowans, Ltd., has been appointed to the London sales executive staff of Siemens Electric Lamps and Supplies, Ltd.

Mr. H. V. Potter, B.Sc., F.I.C., M.I.Chem.E., managing director of Bakelite, Ltd., has been nominated vice-president of the Society of Chemical Industry. All nominations for office in the Society are subject to confirmation at the annual meeting to be held at Ottawa between June 17th and July 1st. Mr. Potter is now in the United States on business and will attend the meeting.

Mr. A. J. Abraham is retiring at the end of the year from the position of borough electrical engineer of Bexley, which he has held for the past sixteen years. Mr. Abraham was born at Toowoomba, Queensland, in 1876, and is thus sixty-two years of age. He was educated at St. John's School, Leatherhead, and received his training at Faraday House and with John Fowler, Leeds, the Uskside Engineering Co., Newport, Mon., and the Northampton Electric Light & Power Co. He entered municipal service in 1898 and was successively with the Worcester, Leyton and Wigan undertakings. In 1901 he became chief assistant engineer at Partick electricity and refuse destructor works, leaving there in 1905 to become chief electrical and consulting engineer, Middle Ward, Lanarkshire County Council. He was appointed engineer and manager of the electricity and refuse destructor works at Aberdare in 1910. At this station all the electricity was generated by means of house refuse. He joined the Bexley undertaking in 1922. Mr. Abraham is a member of the Institution of Electrical Engineers. He has been a contributor to the ELECTRICAL REVIEW and he reminds us that his first article appeared as long ago as 1901.

Mr. A. J. Abraham

Mr. J. R. Beard has consented to continue as president of the Association of Supervising Electrical Engineers for a further year. Mr. Beard has been a partner in the firm of Messrs. Merz & McLellan since 1930.

Lord Hirst, chairman and managing director of the General Electric Co., Ltd., on behalf of himself and his colleagues of the board, presented at Claridge's Hotel, London, on June 9th, silver salvers to **Mr. C. Wilson** and **Mr. S. D. White,** two fellow members of the board, who have each completed fifty years' service with the company. In addition to the chairman, the directors present at the dinner, which preceded the presentation, were Mr. M. J. Railing, vice-chairman and joint managing director, Sir William Noble, Sir John P. Hewett, Mr. A. Chamberlain, Mr. J. H. Farthing, Mr. J. Y. Fletcher, Mr. L. Gamage, Dr. A. H. Railing and Mr. F. Winstanley, together with Mr. T. W. Heather, sales manager, who has since joined the board. Telegrams were read congratulating Mr. Wilson and Mr. White from Messrs. E. G. Byng, M. Solomon, J. Fraser and G. H. Ide, other directors. Mr. White spent his earliest days with the company selling Leclanché cells. Later, he joined the counting house staff and from there was appointed to a position in the bell department, where he spent some years. After a period, during which he looked after business for the Post Office and London, Brighton & South Coast Railway, in 1908 he suggested the formation of a department to handle all business for the Government and railways. He was given the task of organising this department, which he has controlled since that date. He was appointed to the board in 1915. Mr. Wilson, for the first five years of his career,

Messrs. S. D. White and C. Wilson

was secretary to Lord Hirst (then Mr. Hugo Hirst), after which he was appointed manager of the Engineering Department. In 1895 he was transferred to the lamp works at Hammersmith and three years later he was appointed general manager. He has continued in that position until the present time and now controls the complete lamp-making organisation of the G.E.C. at Hammersmith, Wembley and Lemington-on-Tyne. He was appointed to the board in 1919.

Mr. G. A. Ruff has been appointed London district manager for J. H. Tucker & Co., Ltd., in succession to Mr. L. Newton-Davey, who is leaving to take up a new appointment. Mr. Ruff has had a long association with the company both in Scotland and the Midlands. He has already taken up his duties at 2, Newman Street, W.1. (Museum 8081).

Mr. J. W. Scollay, electrical engineer with the Burma Corporation, who was recently appointed electrical engineer and manager to the Lerwick Town Council, has been unable to accept the post. **Mr. J. Stephen,** who has been acting as assistant manager, has been asked to take over the appointment for at least six months.

Sir Alexander Gibb, G.B.E., F.R.S., has been elected chairman of the Association of Consulting Engineers for 1938-39.

Mr. C. J. Dartnall has joined the staff of the Horstmann Gear Co., Ltd., to represent it for electrical products in the North of England and Scotland.

Mr. A. R. Hoare has been appointed a director of the Calcutta Tramways Co., Ltd.

Mr. A. T. Brotherton, J.P., who for many years has been connected with the Brush Electrical Engineering Co., Ltd., has resigned from the board. At one time he was works manager, later being appointed a director.

Obituary

Mr. R. F. P. Blennerhassett.—The death is reported of Mr. Richard Francis Ponsonby Blennerhassett at the age of 58. He was educated at Eton and the City and Guilds Engineering College and received his early training with the American General Electric Co. He subsequently joined the British Thomson-Houston Co., with whom he remained until 1907, when he took up an appointment with the British Aluminium Co. In 1913 he became chief engineer to Edmundson's Electricity Corporation, and at the time of his death was a director of a number of the Corporation's subsidiary companies. Mr. Blennerhassett was a member of the Institution of Electrical Engineers and an associate member of the Institution of Civil Engineers.

Mrs. B. C. Bayley.—We regret to learn from Mr. B. C. Bayley, M.B.E., A.M.I.E.E., electrical engineer to John Player & Sons, Nottingham, that his wife, Mrs. Olive Dorothy Bayley, died on June 17th.

Dr. Ing. E. Banfi.—The death is reported from Milan at the age of sixty-eight of Dr. Ing. Enrico Banfi, a pioneer of electric power supply in Italy.

Will.—The late **Sir William Ray,** who for a period was executive chairman of the British Electrical Development Association, died intestate. His estate is valued at £1,168, with net personalty nil.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares.

New Companies Registered

E. Holloway, Ltd.—Private company. Registered June 17th. Capital, £650. Objects: To acquire the business of an electrical engineer and contractor carried on by E. Holloway at 51, Liverpool Road, Stoke-on-Trent, and 55, Liverpool Road, Newcastle-under-Lyme. The subscribers are: E. Holloway and Mrs. M. J. Holloway, both of 9, Boma Road, Trentham, Stoke-on-Trent. E. Holloway is first director. Registered office: 51, Liverpool Road, Stoke-on-Trent.

F. J. Hancock, Ltd.—Private company. Registered June 17th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in radio, electrical, scientific and television apparatus, &c. F. J. Hancock, 14, Mill Street, Kidderminster, is first director. Registered office: 14, Mill Street, Kidderminster.

Garnett Electrical Installations, Ltd.—Private company. Registered June 18th. Capital, £2,000. Objects: To carry on the business of electrical engineers and installation contractors, lighting specialists, heating and ventilating engineers, &c. The permanent directors are: T. Garnett (managing director) and F. M. Garnett, both of 16, Leyland Road, Southport, Lancs.

Lorimer, Ltd.—Private company. Registered June 18th. Capital, £1,000. Objects: To carry on the business of merchants, engineers' representatives, manufacturers, installers and maintainers of all kinds of engineering, mechanical, electrical, insulating, refrigerating and air-conditioning machinery, &c. The first directors are: J. L. Harvey, 624, Royal Liver Building, Liverpool (permanent chairman and managing director), and others to be appointed. Secretary: James S. Walker. Registered office: 624, Royal Liver Building, Liverpool.

J. Millet (Electrical), Ltd.—Private company. Registered June 11th. Capital, £4,000. Objects: To carry on the business of manufacturers of and dealers in electricity, gas and water apparatus and equipment, &c. The directors are: J. Millet, 39, Bethune Road, N.16: P. Millet, 9, Phillimore Gardens, N.W.10; I. Goodman, 20, St. Andrew's Road, N.16; and L. Heller, 89, Bethune Road, N.16. Registered office: 39, Farringdon Road, E.C.1.

Manuvendors (Electrical), Ltd.—Private company. Registered June 13th. Capital, £700. Objects: To carry on the business of wireless service agents, constructors, installers and maintainers of systems for radio and television reception and transmission,, &c. The directors are: I. M. McLeod, 4. Cardinal's Walk, Hampton, Middlesex; F. M. Ingleton-Davis and M. F. Ingleton-Davis, both of 64, Hampton Road, Teddington. Secretary: Chas. S. R. Sumpter. Registered office: 69, High Street, Walton-on-Thames, Surrey.

Cyril Lawton, Ltd.—Private company. Registered June 9th. Capital, £1,500. Objects: To carry on the business of radio manufacturers, factors, engineers and dealers, letters on hire or sellers on deferred terms of electrical, radio, television and general engineering requisites of all kinds. The directors are: C. Lawton and E. Lawton, both of 32, Woodlands Road, Handforth, Ches. Registered office: 65/7, Moston Lane, Blackley, Manchester, 9.

Accusep, Ltd.—Private company. Registered June 16th. Capital, £3,000. Objects: To carry on the business of manufacturers of and dealers in wood separators and other components of lead-acid batteries, and also complete batteries of all kinds, &c. The directors are: J. F. Plincke, Great South Hawke, Woldingham, Surrey; R. K. May, "Fairways," Woodcote Park Avenue, Purley, Surrey; M. van Westerborg, 9, St. Ivian Court, Muswell Hill; and E. Zeumer, 35, Midhurst Avenue, Muswell Hill. Registered office: 23, Bush Lane, Cannon Street, E.C.

Utilities (Scotland), Ltd.—Private company. Registered in Edinburgh June 11th. Capital, £5,000. Objects: To carry on the business of manufacturers and hirers of, dealers in and agents for vacuum cleaners, washing machines, refrigerators, &c. The directors are: T. Tannahill, 54, Carlaverock Road, Glasgow, S.3; and D. C. Sloan, Knock Castle, Largs, Ayrshire. Secretary: A. Clark. Registered office: 26, Oxford Street, Glasgow.

Returns of Electrical Companies

Paramount Electric & Equipment Co., Ltd.—Capital, £500 in 500 ordinary shares of £1. Return dated December 31st, 1937 (filed May 19th, 1938). Seven ordinary shares taken up. £7 paid. Mortgages and charges nil.

Fairbourne Development Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1937. 660 shares taken up. £660 paid. Mortgages and charges nil.

W. J. Matthews & Co., Ltd.—Capital, £500 in £1 shares. Return dated December 31st, 1937 (filed May 7th, 1938). 450 shares taken up. £450 paid. Mortgages and charges nil.

H. Bailey & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated December 7th, 1937 (filed January 12th, 1938). 1,002 shares taken up. £2 paid, £1,000 considered as paid. Mortgages and charges nil. A return of allotments, made up to March 28th, 1938, shows a further 500 shares allotted for cash and fully called up.

Sussex Electricity Supply Co., Ltd.—Capital, £197,000 in £1 shares. Return dated April 1st. All shares taken up. £197,000 paid. Mortgages and charges nil.

Britannia Radio & Television Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated June 1st, to secure £1,000. Holder: G. E. Brand, 27, Clarence Road, S.W.4.

Universal Lighting Co., Ltd.—Issue on May 5th, 1938, of £275 debentures, part of a series already registered.

Layton Electric Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 31st, to secure £200. Holder: Mrs. Emma Layton, 58, Ipsley Street, Redditch, Worcs.

Novodyne Products, Ltd.—A. C. Nash, 5 and 7, St. Mary Axe, E.C., ceased to act as receiver and manager on June 13th.

Pan Electric, Ltd.—Capital, £200 in £1 shares. Return dated April 5th, 1938. All shares taken up. £196 paid. £4 considered as paid. Mortgages and charges nil.

Wirelessors, Ltd.—The nominal capital has been increased by the addition of £9,000 beyond the registered capital of £1,000. The additional capital is divided into 6,000 10 per cent. non-participating redeemable preference and 3,000 ordinary shares of £1.

Horton Smith & Co., Ltd.—Satisfaction to the extent of £1,000 on July 21st, 1937, of two debentures dated March 28th and August 1st, 1935, and registered April 5th and August 6th, 1935, respectively. Notices filed June 7th, 1938.

Singapore Traction Co., Ltd.—Capital, £575,000 in £225,000 preference stock and £350,000 ordinary stock. Return dated February 23rd, 1938. £225,000 preference stock and £165,209 ordinary stock taken up. £7 paid. £390,202 considered as paid. Mortgages and charges, £172,500.

Ideal Home Electrical Appliances, Ltd.—Capital, £2,000 in £1 shares. Return dated April 27th, 1937 (filed April 7th, 1938). 1,097 shares taken up. £1,097 paid. Mortgages and charges, nil.

Hall Telephone Accessories (1928), Ltd.—Capital, £500,000 in 1,000,000 shares of 10s. Return dated March 17th, 1938. 645,120 shares taken up. £203,148 10s. paid on 406,297 shares. £119,411 10s. considered as paid on 238,823 shares. Mortgages and charges, nil.

Cheadle Electric & Radio Co., Ltd.—Capital, £1,000 in £1 shares. Return dated November 13th, 1937. 600 shares taken up. £600 paid. Mortgages and charges, nil.

City Notes

The General Electric Co., Ltd., reports profits for the year ended March 31st of £1,772,181, as compared with £1,604,512 for the preceding twelve months. To this is added £749,294 brought in, making £2,521,475, from which the following deductions are made: Depreciation, £368,642; directors' remuneration, £4,287; contribution to pension fund, £54,008; preference stock dividend, £185,840; taxation reserve, £400,000; and reserve, £100,000. The ordinary dividend for the year is maintained at 10 per cent. and a bonus of 10 per cent. is also paid (against 7½ per cent.), making the total distribution 20 per cent. (against 17½ per cent.). The balance carried forward is £799,934. The report states that the results of the year's trading constitute a fresh record in the history of the company, which is now entering its fiftieth year, and reflect a period of exceptional prosperity though there were signs of a slackening in demand during the latter part of the year. The company's works have been fully employed. Recent extensions have enabled a greater output to be secured, and the inflow of orders has been maintained at a satisfactory level. This activity is due mainly to general industrial and domestic demand, both at home and overseas, but the company has also fully played its part in connection with the Government's rearmament programme. Overseas business has continued to increase, and the volume of shipments considerably exceeded that in any previous year. In South Africa, Australia, India, New Zealand, Malaya and Argentina the G.E.C. branch companies have enjoyed a successful year's trading, but in China the outbreak of hostilities has destroyed prospects which had appeared hopeful. In February the central stores of the company at Birmingham were completely destroyed by fire. As a result the "stock" figure was diminished, while "sundry debtors" increased, the insurance claims having been paid since the closing of the accounts. After allowing for this, these two items reflect the company's increased activity, and account for the reduction in liquid resources, which at £1,092,000 show a decrease of £713,000. The reserve account now stands at £4,500,000. The number of the company's employés at March 31st was 38,864, an increase of over 800. The contributory pension fund continues to expand; its membership has reached 9,000, and the assets held by the trustees amount to £1,620,000. Accompanying the report is an interesting illustrated booklet dealing with various phases of the company's activities. Meeting: June 27th.

The Revo Electric Co., Ltd.—An encouraging picture of the company's development was given by Mr. Bertram Silcock, the chairman, at Tuesday's annual general meeting. He said that, despite capital expenditure during the year of £54,972, liquid assets were £39,156 higher, and after payment of all liabilities represented over 70 per cent. of the issued capital. The substantial increase in profits had been earned in the face of rising costs by means of increased production and modern plant and equipment, the turnover having increased very materially over the past year in spite of the fact that full benefit had not been derived from 100,000 ft. of extra floor space. These extensions were now completed and would, it was anticipated, substantially augment the output during the current year. The equipment industry was closely connected with the fortunes and development of the electricity supply industry, and it would be seen from the Electricity Commissioners' report that consumption per head of the population was still very much lower than the best American figures. Export figures were not very satisfactory, being considerably below the 1929 level. The industry as a whole, therefore, had considerable scope for development, and while future prospects were obviously dependent on industrial activity, the purchasing power of the community and freedom from international troubles, the immediate prospects of the company were very promising. The works were running to capacity and orders in hand were exceedingly satisfactory.

The Electric Construction Co., Ltd., reports a profit for the year ended March 31st, after providing for debenture interest and depreciation, of £79,353, to which is added £19,652 brought in, making £99,005. It is proposed to distribute this as follows:—Provision for income-tax and N.D.C., £12,500; payment of 10 per cent. and a bonus of 2½ per cent. on the ordinary shares, £37,500; transfer to dividend equalisation fund, £10,000; transfer to general reserve, £7,477; and transfer to investment reserve account, £3,500. The balance carried forward is £23,634. The report states that the demand for the company's products predicted at the beginning of the past financial year was fulfilled, the output in every department of the factory having increased. To restore amounts utilised in recent years for additions to buildings and plant, and to provide additional working capital, 37,220 unissued 7 per cent. preference shares of £1 each have been sold on the Stock Exchange at 27s. per share. These shares rank for dividend from April 1st last. The premium (less the cost of issue) has been credited to general reserve. The workpeople are to receive annually one week's holiday with pay.

Telephone Rentals, Ltd.—Presenting his annual report at last Monday's general meeting Mr. F. T. Jackson, chairman and managing director, stated that all subsidiaries had traded at a profit during the year, the operating companies had made considerable progress, and the new rentals secured by these companies constituted a record. Trade generally was most satisfactory and was attributable to a large extent to the development of the company's sales promotion plans. The chairman did not anticipate, however, that at this time next year he would be able to report so favourably on general industrial activities. Reports from operating companies all over the country indicated a falling off in trade, but during the first five months of 1938, although it was a little more difficult to secure new contracts, the new business obtained was only slightly less than for the first five months of last year. This did not indicate, however, that there would be a decline in profits earned, for the annual revenue from their large number of rental contracts ran over a period of years and was consequently not affected by a diminution in general trading activities.

The British Electric Traction Co., Ltd.—The advice that the company's stock must not be looked to for income but for increase of capital value was given by Mr. J. S. Austen, chairman of the company at the annual general meeting held last Friday. It was, he said, "a sort of automatic savings bank," and an original holder of £100 of stock, if he had kept every bonus as it was declared, was worth something like £4,500, even at the present depreciated value of the stock. The company had been considerably affected by the increase in the petrol tax since it held over 1,800,000 shares in the Tilling & British Automobile Traction Co. Every tax was a necessary evil but this tax seemed rather more evil and rather less necessary than usual. Moreover, when transport was taxed industry was taxed. With regard to the future the chairman said that shareholders must not expect a continuance of the phenomenal increases of the past two years, but at the moment he did not know that there was in the general situation any reason why the company should not show at least a moderate increase in the current year.

The Hendon Electric Supply Co., Ltd., has now announced the terms of the offer received from the North Metropolitan Electric Power Supply Co. for its shares. The terms proposed are £1 of Northmet ordinary stock for each Hendon £1 ordinary share and £1 of 6 per cent. preference stock for each £1 preference share. The offer is conditional on acceptance by July 4th. The directors of the Hendon Company, who recommend acceptance of the offer, remind shareholders that the undertaking is purchasable by the local authority in 1946 and that impending legislation might lead to an earlier purchase. The Electric Supply Corporation, which holds 55,000 ordinary shares in the Hendon Co., has agreed to exchange its holding.

The Globe Telegraph & Trust Co., Ltd., reports a net revenue of £264,747 for the year ended May 31st, as compared with £219,557 for 1936-37. To this is added £128,538 brought in, making £393,285. The final ordinary dividend is 7s. 6d. per £10 share, making a total distribution of 7½ per cent. net (against 5½ per cent. net) and £135,454 is carried forward. A special bonus of 2½ per cent. net on the ordinary shares is recommended on account of the 4 per cent. funded income stock of Cable and Wireless (Holding). Ltd., received by the company in satisfaction of arrears of dividend on the 5½ per cent. preference stock. Meeting: June 28th.

Oliver Pell Control, Ltd., reports a trading profit for the year ended March 31st of £29,310 as compared with £45,059 for 1936-37, and a net profit of £9,068 (against £2,972). The balance available is £9,782, which has been disposed of as follows:—Preference dividend for the half-year ended December 31st, 1937, £1,500; to writing down investments, £2,000; writing down development account, £1,500; carried forward, £4,782. The directors state that the factories are fully employed, with rising output, which is expected to be maintained as the company is well supplied with orders.

The B. C. & H. Power Station Co., Ltd., the company formed by the Edmundson's group to finance the construction of a new selected station in Bedfordshire, is issuing £1,650,000 3½ per cent. first mortgage debenture stock at 99. Interest and sinking fund will be covered by the Central Electricity Board, under whose direction the station will operate. The stock will have a maximum life of twenty-five years. The subscription list was to open and close yesterday (Thursday).

A. Reyrolle & Co., Ltd., are to hold an extraordinary meeting on July 7th to consider resolutions for the adoption of new articles of association which will facilitate the granting of an official quotation by the London Stock Exchange. The new articles provide *inter alia* for the maximum number of directors to be increased from seven to ten. The conversion of the shares into stock will also be proposed.

Keith Blackman, Ltd., report a trading profit for the year ended March 31st of £174,623, as compared with £156,559 in the preceding year, and after deducting expenses, income-tax, &c., a net profit of £55,158 (gainst £50,368), to which is added £13,426 brought in, making £62,803. The dividend on the increased ordinary capital is unchanged at 20 per cent., and £31,991 is carried forward.

The Young Accumulator Co. (1929), Ltd., reports a trading profit of £11,275 for the year ended March 31st last, as compared with £9,677 for the preceding year. After providing for interest, depreciation, &c., the net profit was £6,923 (£5,523). A dividend of 3½ per cent. (3 per cent.) is to be paid, leaving £4,518 (£2,504) to be carried forward.

Herbert Terry & Sons, Ltd., report a net trading profit of £104,362 for last year, as compared with £99,490 in the previous twelve months. The net profit is £73,392 (£80,338). A final dividend of 20 per cent. is to be paid, making 30 per cent., less tax (22½ per cent., tax free), and £12,821 (£12,492) is carried forward.

Mirrlees Bickerton & Day, Ltd., report a net profit for the year ended March 31st of £19,639, as compared with £11,921 in the preceding year, to which is added £1,762 brought in. The dividend for the year is 4 per cent. (against 2½ per cent.), and £5,008 is carried forward.

Greenwood & Batley, Ltd., propose to pay a final dividend of 7 per cent., making 10 per cent. (against 7 per cent), plus a bonus of 5 per cent. (nil). The company made a trading profit of £139,295 for the year ended March 31st last (against £64,315) and a net profit of £104,362 (£50,948). A sum of £29,830 (£22,255) is carried forward.

The Mid-Wales Electric Power Co. reports that the dividends receivable from its subsidiary company for 1937 amount to £2,246, and the net profit is £10, which has been added to the sum brought in, making £119 to be carried forward.

La Plata Electric Tramways Co. reports net receipts for 1937 of £7,294 (against £8,210) and a loss of £1,391 (profit £1,368). A sum of £15,074 is carried forward.

The Ceara Tramway, Light & Power Co., Ltd.—Holders of 5½ per cent. first debenture stock have approved a moratorium in regard to the interest and redemption of the debenture stock.

R. A. Lister & Co., Ltd., are to maintain their interim dividend at 5 per cent.

The Nico Light Co., Ltd., announces a first and final dividend of 6¼ per cent. (same).

Stocks and Shares

TUESDAY EVENING.

THE outstanding feature of the week is the complete change that has come over the complexion of American securities, owing to an improved tone, largely sentimental, in Wall Street, from which has sprung unexpected strength, not only in stocks and shares but in the prices of commodities and metals. The mere fact of New York putting a brighter face upon its outlook has made a decided difference to a number of markets on this side, to some extent bringing about an increase of business and, incidentally, driving to cover the numerous bears who for some time past had found in the American markets a profitable field for short sales.

The other outstanding feature is the after-effect of the success achieved by the issue of the British Government £80 million National Defence three per cent. stock, offered at 98. The issue would probably have gone well had it been twice as large, and a premium of 15s. per cent. was established on the price within a few days of the allotment letters' appearance.

Taken together, these two factors have served to infuse a fresh feeling of confidence in the minds of investment and speculation. It is unfortunate that the latest Cable and Wireless index figure should have provided further disappointment. On the other hand, expectation has again been aroused as to the possibly early termination of the war in Spain. Stock Exchange markets as a whole are in a more cheerful frame of mind than they have been for some time past, and notwithstanding the attractions of tennis, cricket and other outdoor sports, business in the House has shown a tendency to expand.

Gilt-edged Stocks

In appealing to the genuine investor, the Treasury chose a course more popular than the technique used on previous occasions where the Government Departments have taken up the bulk of the issues for gradual release into the Consol market. Last week's applications were clearly actuated by the idea of investment rather than the hope of a quick capital profit. For the gilt-edged market itself, the result of the issue has meant an adjustment of prices in those stocks with which the new loan comes into competition. On the whole, the success of the issue has had a tonic effect, heightened by the removal of present uncertainty of the Government's intentions, and the knowledge that there will a lengthy holiday from further borrowing of this nature. Resumption of trustee borrowing is regarded as a natural sequel to the demonstration of a heavy pressure of unemployed money seeking a safe outlet on anything like reasonable terms.

G.E.C. Profits

General Electric ordinary shares, which had risen from 69s. to 72s. on the increase in the total distribution from 17½ to 20 per cent., advanced another 3s. when the full accounts were made known. This rise fully cancelled out the deduction of the dividend from the price. Figures showing a 10 per cent. increase, to a record height, in net profits put the finishing touch to the excellent impression created by the dividend announcement. The report makes the now familiar observation that activity slackened to some extent towards the end of an exceptionally active year. It is noted, however, that earnings are equal to about 37½ per cent. on the ordinary capital, affording a wide cover for the protection of the dividend against the possibility of quieter conditions continuing through

the present year. At the ex-dividend price of 72s., the shares pay over 5½ per cent. on the money, and exemplify the very respectable returns which are now to be obtained from industrial investments in the topmost flight.

Electrical Equipment Shares

Publication of the Electric Construction Company's accounts showed that the previously announced increase in the dividend from 10 to 12½ per cent. entailed no departure from the conservative dividend policy, but it was without effect on the price of the shares. These stand at 32s. 6d., and pay over 7½ per cent. on the money. Brush Electrical ordinary stock put on 2 points, to 26½, after the meeting, at which approval was given to the capital reorganisation scheme. The chairman reviewed prospects under the new conditions. The cable manufacturing group took a turn for the better after Callenders meeting. Callenders themselves picked up to 86s. 3d., and British Insulated to 4$\frac{3}{16}$. Elsewhere, the market in electrical equipment shares provides few features of outstanding interest. Ever Ready shares fell 1s. to 19s., holders being rendered uneasy by the absence of a bonus, such as was paid last year, on top of the 35 p.c. dividend. Talk of keen competition contributes to the dullness of Ever Ready shares.

British Electric Traction

Good humour at this company's annual meeting arises from the unvaried excellence of the accounts, and is warmed by Mr. J. S. Austen's own way of enlarging on them. Although the chairman has no use for valuations—he described a simple process for trebling at a stroke the value of the deferred stock—he was able to point to an increase in profits which has made the company, as a going concern, worth a million pounds more than it was a year ago. No doubt was left as to how deferred stockholders should regard their investment. Not income, but rising capital value is the thing: it is, in fact, an automatic savings bank, in which the original holder of £100 deferred stock, who retained every scrip bonus, is now worth something like £4,500. For many years the policy has been to distribute annually 5 per cent. in cash and 10 per cent. in free stock. This explains the particular popularity of the issue with payers of super-tax.

Victoria Falls Dividend

With one or two small exceptions, the Victoria Falls & Transvaal Power Company supplies all the electrical requirements of the great gold-mining companies of the Rand, as well as many municipal and industrial consumers. With so active a market as a background, the company's decision to raise the ordinary dividend from 12 to 13½ per cent. caused no more surprise than can be measured by a 9d. rise in the price of the shares. Past records of the company's profits and dividends make unusually even reading. For many years up to 1934 the dividend was maintained at 15 per cent. As the result of a steady under-distribution of profits, a capital bonus of 150 per cent. was given in 1934, and was followed by 12 per cent. dividends in the two following years. At their ex-dividend price of 63s. 9d., the ordinary shares yield 3¾ per cent., a return which reflects the stability of earnings as much as the investor's partiality for South African securities at a time when gold is much to the forefront in world affairs.

Miscellaneous Matters

Having dropped a further 2 points, to 45½, the price of Cable and Wireless ordinary stock is now 10 points lower than it was a month ago, and some 23 points below the year's top mark. This latest fall is a reaction to the disclosure that traffics in May—the first full month of the new Empire flat-rate scheme—were lower than in any month since July, 1932. The preference and income stocks are unchanged. Other communication stocks have a better tendency, there being gains in Oriental Telephones, at 58s. 9d., Great Northerns, at 36½, Western Union, at 22½, and American "Tel. and Tel." at 131½, ex-dividend. The last two rises are part of Wall Street's general advance. In the traction group, Home Railway stocks show signs of revival, and Tillings have jumped from 41s. 9d. to 43s. 3d. London Transport "C" stock, at 73½, is 10s. lower. West Ridings, which show a rise of 1s. 3d., to 32s. 9d., are quoted ex-rights to the new shares. The latter are changing hands around 12s. 6d. premium. Except for 1s. losses in Metropolitans, at 49s., and Lancashires, at 32s., electricity supply shares show few price-movements of interest. Hendon Electrics were marked up from 45s. to 46s. 3d., coming into line with North Metropolitan Electric ordinary. The latter company is offering £1 of its own ordinary and preference stocks in exchange for every corresponding £1 share held by the proprietors of Hendon Electric. Steel and engineering shares claim a good deal of the business passing in the industrial markets, prices having made further headway in many instances.

Atkin's Manual

This week there has appeared the 1938 edition of Atkin's Manual, compiled by a well-known firm in the Stock Exchange market for electrical and kindred securities. The volume is one of the largest and most comprehensive of the many manuals issued by Stock Exchange firms. It gives particulars of practically every important company connected in any way with electricity, together with charts and articles upon the Electricity Commissioners, Central Electricity Board, &c. Details are set out, in many cases, of progress and earnings of companies from 1928 onwards.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Last.	Price June 21.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	63/9	—	4 14 4
City of London	1	7½	7½	33/6	—	4 9 7
Clyde Valley	1	7	8	36/–	+6d.	4 10 2
County of London	1	10½	10½	48/6	—	4 6 7
Edmundson's 7% Pref.	1	7	7	32/–xd.	+6d.	4 7 6
Do. Ord.	1	8	9	38/–	—	4 14 9
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 9
Elec. Fin. and Securities	1	12½	12½	50/–	—	5 0 0
Elec. Supply Corporation	1	11	12	51/3	—	4 13 8
Lancs Light and Power	1	7½	7½	32/–	—1/–	4 13 9
Lond. Assoc. Electric	1	—	7	30/–	—	4 13 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red.	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	12	49/–	—1/–	4 18 0
Midland Counties	1	7½	8	36/6	—	4 7 8
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	7	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	32/6	+6d.	4 6 2
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	46/3	—	4 6 6
Do. do. 6% Pref.	1	6	6	29/6	—	4 1 4
Scottish Power	1	8	8	36/–	—	4 9 0
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 6
Yorkshire Elec.	1	8	8	40/6	—	3 19 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	—	4 7 9
Do. 1955–75	,,	5	5	116	+2	4 6 2
Do. 1951–73	,,	4½	4½	108	—	4 3 4
Do. 1963–93	,,	—	3½	98	—	3 11 5
London Elec. Trans. Gtd.	,,	—	2½	93	—	2 13 9
London & Home Counties, 1955–75	,,	4½	4½	112	—	4 0 4
London Passenger Transport, A	,,	—	4½	115½	—½	3 18 0
Do. do. B	,,	—	5	116½	+½	4 5 10
Do. do. C	,,	4	4½	73½	—½	5 15 10
West Midlands Joint Elec. 1948–68	,,	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	131½xd.	+½	6 17 0
Anglo-Am. Tel. Pref.	Stock	6	6	107	+½	5 12 2
Do. Def.	,,	1½	1½	25	—	6 0 0
Cable & Wireless 5½% Pref.	,,	4½	5½	96	—	5 14 7
Do. Ord.	,,	—	4	45½	—2	8 17 10
Do. Income	,,	—	—	100½	+½	3 19 6
Globe Tel. & Tel. Ord.	10	5½*	7½*	15	—	5 0 0
Do. do. Pref.	10	6	6	13½	—	4 10 7
Great Northern Tel.	10	20	20	36½	+½	5 9 7
Marconi-Marine	1	10	7½	25/–	—	6 0 0
Oriental Telephone Ord.	1	12*	12*	58/9	+3/9	4 1 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	13	—	—
British Electric Traction Def. Ord.	,,	5	5	900xb.	—	—
Do. do. Pref. Ord.	,,	8	8	160	—	5 0 0
Brazil Traction	$100	70 cts.	$1	11½	+1½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	99	—	5 1 0
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. do. 1st Bonds	$500	5	5	25	—	—
Victoria Falls Ord.	1	20	12	63/9xd.	+9d.	3 15 6
West Riding	1	6½	10	32/6	+⅛	—
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1¾xd.	+1/6	8 11 6
Assoc. Elec. Ord.	1	10	10	36/0	—6d.	5 11 1
Do. Pref.	1	8	8	36/6	—	4 7 6
Babcock & Wilcox	1	10	10	38/9	—	5 3 1
British Aluminium Ord.	1	10	12½	49/–	+1/6	5 2 3
British Insulated Ord.	Stock	20	20	4⅛	+¼	4 15 6
Brush Ord.	,,	Nil	Nil	26½	+2	—
Callenders'	1	20	20	4⅛	+¼	4 12 9
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	25/–	—	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	32/6	—	7 13 10
Enfield Cable Ord.	1	25	25	2¾	—	—
English Electric	1	Nil	10	26/6	+6d.	7 11 0
Do. do. Pref.	1	6½	6½	25/6	—	5 2 0
Ericsson Tel.	5/–	25	25	36/3	—	3 8 9
Ever Ready	5/–	45	35	19/–	—1/–	9 4 2
Ferranti Pref.	1	7	7	27/6xd.	+6d.	5 2 0
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	17½	20	72/–xd.	+3/–	5 11 1
Henley's	5/–	15	20	20/–	—	5 0 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	36/3	—9d.	6 18 0
Lancashire Dynamo	1	20	25	55/–	—	9 2 0
Siemens Ord.	1	7½	7½	23/9	—	6 6 4
Telegraph Construction	£1	7½	10	37/6	—	5 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

23059. "Cathode-ray tubes." Radioakt.-Ges. D. S. Loewe. August 23rd, 1935. (485904.)

25510. "Electric heat treatment of metal articles." F. S. Denneen and W. C. Dunn. September 19th, 1936. (485752.)

26067. "Thermionic amplifying systems." Standard Telephones and Cables, Ltd., D. H. Black and W. Lawrence. September 25th, 1936. (485,854.)

28506. "Telephone systems and the like." Telephone Manufacturing Co., Ltd., and L. H. Paddle. October 20th, 1936. (485652.)

28555. "Obstruction light for overhead conductors." J. Fodor. October 20th, 1936. (485855.)

28619. "Cathode-ray oscillograph television and like systems." W. E. Benham. October 21st, 1936. (485653.)

32020. "Electrical systems." Philco Radio and Television Corporation. November 23rd, 1935. (485924.)

32030. "High-speed electric circuit-closing mechanism." British Thomson-Houston Co., Ltd. November 25th, 1935. (485926.)

32142. "Electrical control of bulkhead and like remotely controlled doors." J. Stone and Co., Ltd., and D. E. James. November 24th, 1936. (485758.)

32162. "Electric induction motors." M. W. Woods, Ltd., and B. B. Daly. November 24th, 1936. (485928.)

32169. "Overhead conductors for electric vehicles. A. H. Stevens. (R. R. Holden, Inc.) November 24th, 1936. (486011.)

32170. "Overhead conductors for electric vehicles." A. H. Stevens. (R. R. Holden, Inc.) November 24th, 1936. (485860.)

32171/2. "Double-conductor trolley systems for electric vehicles." A. H. Stevens. (R. R. Holden, Inc.) November 24th, 1936. (485759/60.)

32202. "Electrical systems for transmitting angular movements." Contraves Akt.-Ges. August 5th, 1936. (485930.)

32399. "Electric inductor relays." Express Lift Co., Ltd., and L. E. W. Wells. November 26, 1936. (485666.)

32432. "Cathode-ray type direction-finders." J. P. Jeffcock. November 26th, 1936. (485764.)

32437. "Time-base circuits using thermionic valves. British Thomson-Houston Co., Ltd., and D. J. Mynall. November 26th, 1936. (485934.)

32520. "Method for the sealing-off of electric lamps." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). November 27th, 1936. (485937.)

32533. "Methods of electrical frequency submultiplication." Baird Television, Ltd., and R. G. Tingley. November 27th, 1936. (486017.)

32556. "Electron multiplier tubes and systems. Standard Telephones and Cables, Ltd. December 28th, 1935. (485020.)

32570. "Alternating-current track circuit signalling systems for railways and the like." L. H. Peter, D. G. Shipp and Westinghouse Brake and Signal Co., Ltd. November 27th, 1936. (486022.)

32578. "Automatic safety switches operated by the tilting of a vehicle." W. M. Gardner. November 27th, 1936. (486024.)

32647. "Electric lampholders." J. Stone and Co., Ltd., and W. J. Ruston. November 28th, 1936. (486028.)

32836. "Electron-discharge multiplier devices and arrangements incorporating the same." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1935. (485672.)

32837. "Electrical time-base circuits." Marconi's Wireless Telegraph Co., Ltd., D. L. Plaistowe and D. J. Fewings. November 30th, 1936. (486041.)

33087. "Mercury luminous electric-discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). December 2nd, 1936. (Cognate application 28753/37.) (485875.)

33202. "Battery-charging systems." General Electric Co., Ltd., E. H. Croft, and J. C. Turrall. December 3rd, 1936. (485675.)

33218. "Air-space-insulated electric conductors." Siemens & Halske Akt.-Ges. December 4th, 1935. (485946.)

33343. "Electrode for arc-welding light metals and their alloys, and method of producing the same." Vereinigte Aluminium-Werke Akt.-Ges. December 4th, 1935. (485676.)

33675. "High-pressure metal vapour electric-discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. December 8th, 1936. (485877.)

35454. "Cables for the transmission of ultra-short electric waves." Siemens & Halske Akt.-Ges. December 24th, 1935. (485948.)

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50. "Junction-boxes for electrical installations." F. S. Lobl. January 1st, 1937. (485882.)

75. "Directive wireless antennæ." Standard Telephones & Cables, Ltd. January 11th, 1936. (485682.)

843. "High-voltage electric switchgear installations." Siemens Schuckertwerke Akt.-Ges. January 11th, 1936. (485776.)

1070. "Image producing or converting electron multiplier tubes." Farnsworth Television, Inc. February 24th, 1936. (486048.)

1857. "Electrically heated mats, rugs, and the like." L. P. Hammond. January 21st, 1937. (485687.)

2849. "Frequency characteristics of resonant circuits in electrical systems." B. M. Hadfield. February 1st, 1937. (486049.)

3068. "Fluid-blast electric circuit-breakers." General Electric Co., Ltd., and F. J. Keeley. February 2nd, 1937. (486050.)

4253. "Vacuum tight sealing of tungsten or molybdenum conductors through quartz glass or glasses of high silica content." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen.) February 12th, 1937. (485786.)

4780. "Electric-discharge lamps." British Thomson-Houston Co., Ltd., and C. J. Milner. February 17th, 1937. (485787.)

5149. "Electrical and other small encased instruments." N. Ryder, S. J. Eidsforth, and Metropolitan-Vickers Electrical Co., Ltd. February 20th, 1937. (485790.)

6258. "Electric welding tongs." Keller & Knappich Ges. March 6th, 1936. (485792.)

6441. "Alarm devices for thermionic valve circuits." Telephone Manufacturing Co., Ltd., and L. H. Paddle. March 4th, 1937. (485891.)

7404. "Gas meters, electricity meters, and the like." J. H. Robinson & Co. (Liverpool), Ltd., and T. Fox. March 13th, 1937. (485795.)

8405. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 25th, 1936. (485798.)

8683. "Electric vibrator." F. B. Dehn. (Automatic Musical Instrument Co.) March 24th, 1937. (485892.)

10199. "Multi-filament electric lamps." F. J. Major. April 9th, 1937. (485894.)

10807. "Signalling systems wherein the signals are formed by electrical impulses." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, R. Barthelemy, and T. Vogel. April 15th, 1937. (Addition to 437539.) (485703.)

12361. "Means for illumination comprisng both an electric-discharge device and an incandescent filament." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen.) April 30th, 1937. (485954.)

12362. "Manufacture of magnetic materials suitable for the cores of inductors of low dissipation." General Electric Co., Ltd., C. G. Smith, and S. V. Williams. April 30th, 1937. (486057.)

12815. "Latching mechanisms for electric circuit-interrupters." Westinghouse Electric & Manufacturing Co. May 14th, 1936. (485811.)

13391/13416. "Electric cable systems." Okonite-Callender Cable Co., Inc. May 14th, 1936. (486059/486061.)

14667. "Screw plug and like automatic electric switches." Allgemeine Elektricitats-Ges. May 26th, 1936. (Cognate application 14668/37. (486062.)

14887. "Electric motors." A. Schonwald. May 28th, 1937. (485709.)

14889. "Mountings for dynamo-electric machines." British Thomson-Houston Co., Ltd. May 28th, 1936. (Addition to 442904). (485958.)

16063. "Apparatus for the electrical protection of gaseous and other discharge tubes." H. E. M. Barlow. June 10th, 1937. (485816.)

16388. "Cathode-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 15th, 1936. (486063.)

16389. "Optical copying of oscillation record having depth variations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 15th, 1936. (485961.)

17506. "Measuring apparatus for high-frequency alternating currents." Siemens & Halske Akt.-Ges. June 26th, 1936. (486065.)

17622. "High-pressure metal-vapour electric discharge lamps." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). June 24th, 1937 (486066.)

19785. "Electric heat treatment of steel rails," Welding Service, Inc. July 27th, 1936. (485966.)

20372. "Vacuum electric incandescent lamps." General Electric Co., Ltd. December 8th, 1936. (485898.)

20599. "Gettering of metallic bulb electric-discharge tubes." Egyesult Izzolampa es Villamossagi Reszvenytarsasag. July 24th, 1936. (486068.)

21485. "Apparatus for screening out secondary X-rays." E. Otvos. January 7th, 1937. (485821.)

23680. "Switch for electrically controlled adjusting devices for variable pitch propellers." Vereinigte Deutsche Metallwerke Akt.-Ges. January 14th, 1937. (485823.)

23681. "Electrically controlled switching device for variable-pitch propellers." Vereinigte Deutsche Metallwerke Akt.-Ges. January 13th, 1937. (485968.)

23736. "Electro-magnetically operated switches." A Cianchi. August 31st, 1937. (485824.)

25388. "Non-spill vent plugs for electric accumulator cells." Chloride Electrical Storage Co., Ltd. (J. L. Woodbridge). September 18th, 1937. (485724.)

25913. "Electric induction heaters for the heat-treatment of metal articles." F. S. Denneen, W. C. Dunn, and C. N. Mitchell. September 19th, 1936. (Divided out of 485651.) (485729.)

28313. "Rectifier arrangements for heavy currents." Siemens-Schuckertwerke Akt.-Ges. October 16th, 1936. (485832.)

28495. "Manufacture of dry selenium rectifiers for electric current." Siemens-Schuckertwerke Akt.-Ges. October 19th, 1936. (486073.)

32155. "Television synchronising systems." Philco Radio & Television Corporation. November 23rd, 1935. (Divided out of 485924.) (485991.)

32936/7. "Carrier telephony systems." Siemens & Halske Akt.-Ges. November 27th, 1936. (485992/3.)

33339. "Electron-valve amplifiers." Telefonaktiebolaget L. M. Ericsson. December 3rd, 1936. (485995.)

33507. "Metal-vapour electric-discharge apparatus." Siemens-Schuckertwerke Akt.-Ges. December 30th, 1936. (485735.)

34453. "Circuits for amplifying electrical oscillations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 16th, 1936. (485737.)

35127. "Sheathed electrode for arc welding aluminium and aluminium alloys." W. W. Triggs (Vereinigte Aluminium-Werke Akt.-Ges.). December 4th, 1936. (Divided out of 485676.) (485741.)

35558. "Cables for the transmission of ultra-short electric waves." Siemens & Halske Akt.-Ges. December 24th, 1935. (Divided out of 485948.) (485996.)

1938

1301. "Electrically heated radiator." G. Jonsson, A. Gudmundsson and S. Runolfsson. January 14th, 1938. (485849.)

1834. "Electric welding apparatus." British Thomson-Houston Co., Ltd. January 20th, 1937. (486081.)

2531. "Means for controlling the vapour pressure in electric-discharge devices." British Thomson-Houston Co., Ltd. January 26th, 1937. (485851.)

3000. "Multi-channel carrier signalling systems." Siemens & Halske Akt.-Ges. February 3rd, 1937. (486082.)

3276. "Electrical systems for forming accurately timed signal pulses." Philco Radio & Television Corporation. November 23rd, 1935. (Divided out of 485924.) (485999).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Extensions and alterations to Marischal college (£144,000); the principal.

Arbroath.—Cinema for Associated British Cinemas, Ltd.; W. R. Glen, architect, 30, Golden Square, London, W.1.

Barnsley.—Central garage, Pontefract Road; borough engineer.

Bath.—Houses (538), in three contracts, Roundhill and Whiteway estates; city engineer.

Bedford.—Town hall; borough surveyor.

Bedfordshire.—Technical college, between Cardington Road and St. John's Street, Bedford, for E.C.; director of education, Shire Hall, Bedford.

Berwick-on-Tweed.—Houses (70), Bildenden estate; borough engineer.

Bradford.—Houses (380), Canterbury Avenue estate, for Corporation; city architect.

Brentford.—Large extensions to factory, Great West Road, for Tecalemit, Ltd.; Sir Banister Fletcher & Son, architects, King's Bench Walk, Temple, London, E.C.4.

Brighton.—Cinema, &c., North Street; A. G. Macdonald, architect, 14, John Street, London, W.C.2.

Cambridgeshire.—School, Cambridge (£52,200), for the County Council; Coulson & Son, Ltd., builders, Cambridge.

Carlisle.—Houses (18), Bedford Road; W. C. Johnson. Extensions to turbine house, Holme Head; Ferguson Bros., Ltd.

Castle Bromwich.—Houses (17), Marlborough Road site; Hales & Co., builders, Whateley Hall estate.

Cheadle (STAFFORDSHIRE).—Houses (150); A. P. Hancock, R.D.C. surveyor.

Cheltenham.—Additions to the St. Mary's Church of England Training College for Schoolmistresses (£70,000), with electrical work.

Chichester.—School; R.C. trustees.

Consett.—Houses (90), Dale Avenue; U.D.C. surveyor.

Coventry.—Houses (170), Pinley Fields site; E. H. Ford, city surveyor. Houses (46), Purcell Road; A. Friswell, Dennis Road.

Darlington.—Houses (32), Davison Road; Bussey and Armstrong, builders, Brinkburn Road.

Denny (STIRLINGSHIRE).—Cinema (£12,000), for Commercial Cinematograph Co., Ltd., Dundee; the secretary.

Devonport.—Flats (24), Cornwall Street; Building and Public Works Construction Co., Ltd.

Dorchester.—Showrooms, Victoria Street; Y. Meyers.

Dovercourt.—Cinema, for J. Elliott; F. E. Bromige, architect, Regent Street, London, W.1.

Dudley.—Large stores, fronting on High Street; Mark Round & Son, builders, New Street.

Durham.—Houses (113); R.D.C. surveyor. Extensions to University (£364,000); F. Willey, architect, 34, Old Elvet.

East Ham.—Houses (77), Bonny Downs, for B.C.; F. E. Smith, builder, Grays.

Edinburgh.—Additions and alterations to Astley Ainslie Institution, Grange Loan; J. A. Arnott, architect, 24, Duke Street, Edinburgh.

Gateshead.—Houses (10), Ilfracombe Garden; E. P. Calderwood, builder, Chowdene estate.

Gillingham.—School, Twydall Lane; R. Booth, town clerk.

Gorleston-on-Sea.—Houses (12), Middleton Road; W. West.

Great Yarmouth.—Houses (14), Bells Marsh Road; borough engineer.

Handforth (CHESHIRE).—Houses (30); Halliday & Agate, architects, 14, John Dalton Street, Manchester.

Hatfield.—Nurses' home, Wellfield Institution; C. M. Crickmer, architect.

Hebburn-on-Tyne.—Houses (26), Lambley Crescent; J. M. Black, junior, builder, 143, Victoria Road, West Hebburn.

Hebden Royd.—Swimming baths (£21,000); U.D.C. surveyor.

Hetton-le-Hole (Co. DURHAM).—Houses (97); A. H. Fennell, architect, Bridge End Chambers, Chester-le-Street.

Hove.—Flats (250), Summerhill Road; Bell Property Trust, Ltd.

Ipswich.—Houses (20), Priory estate; Simms, Son & Cooke, Ltd. School (£32,105); Sadler & Sons. Extensions to tobacco factory; W. A. & A. C. Churchman.

King's Lynn.—Large extensions, West Norfolk and King's Lynn General Hospital, London Road; D. H. Loukes, architect, 64, St. Andrew's Street, Cambridge.

Lanchester (Co. DURHAM).—Hospital, G. Gradon and Son, contractors, North Road, Durham City.

Leek.—Hospital, Ball Hay; Wood & Goldstraw, architects, Tunstall.

Leicester.—Central bathing establishment, café and car park (£151,000), for City Council.

Llantwit Major (GLAMORGANSHIRE).—Cinema, for Bridgend Cinemas, Ltd.; E. Loveluck, architect, 12, Dunraven Place, Bridgend.

London.—(FINSBURY).—Houses, Busaco Street, for B.C.; Messrs. Tecton, architects, Haymarket, S.W.1. (N.W.1).—Ward blocks, Western Ophthalmic Hospital, Marylebone Road; Young & Hall, architects, 17, Southampton Street, W.C.1.

Longton (STAFFORDSHIRE).—Houses (50), near Smith Street; W. C. Beech & Co., Ltd. Rebuilding premises, Church Street; Wood & Goldstraw, architects.

Lowestoft.—Estate development, Normanston Drive; J. Gaze & Sons.

Maidstone.—Extension to Kent County Ophthalmic Hospital, Church Street (£10,000); A. B. Knapp-Fisher, architect, 6, Bryanston Street, Welbeck, London, W.1.

Manchester.—Houses, Penryhn, Orme and Middleton (Ruthin Avenue, Roundthorn Road and Kingsway); W. R. Dykes, estate agent, 27, Victoria Buildings, St. Mary's Gate. Flats (26), Barlow Moor Road and Palatine Road, West Didsbury, for Lawson Properties, Ltd.; H. O. Hamilton, architect, 27, Park Lane, London, W.1.

Middlesbrough.—Houses (50), Brambles Farm estate; borough engineer.

Mirfield.—Houses (22), at the junction of Shillbank Lane and Hepworth Lane; Dutton & Burdekin.

Newcastle-on-Tyne.—Houses (20), Hay Leazes Road; E. Jeffcock, builder, Lemington. Houses (10), Loven Road; Gibson Bros., builders, Hill Heads, Whitley Bay. Cinema, Scotswood, for J. R. Scott; R. Burke, architect, Singleton House, Northumberland Road. Factory, Benfield Road, for Harrads, Ltd.; C. S. Errington, architect, 46, Grainger Street.

Newcastle-under-Lyme.—Houses (84), for R.D.C.; A. P. Lovatt, architect, Hanover Chambers, Brunswick Street, Newcastle, Staffs.

Newport (MONMOUTHSHIRE).—Secondary school (£109,275), for the E.C.

Nuneaton.—Houses (42), Tryan Road, Nuneaton; T. Barker & Son, builders, Loughborough. Houses, Vernon Lane estate and Tryan Road; borough surveyor. Additions to the Manor Park Senior schools (£20,201), with electrical work; G. E. and W. Wincott, builders, Chapel Street.

Oxford.—Dwellings (160), Slade estate, Cumberland Road estate, Canning Crescent, and Upper Farm, Wolvercote; A. Carstairs, city surveyor.

Plymouth.—Houses (16), Frederick Grove; Fredco Estates, Ltd. Houses (118), Lopes Road, etc.; St. Aubyn Estates, Ltd. Houses (18), Weston Mill Hill; Taylor Woodrow Estates, Ltd. Flats and shops, Richmond Street and Willow Street; city engineer.

Portsmouth.—Houses (35), Northern Parade; R. J. Winnicott. Extensions to factory, Aerodrome; Airspeed, Ltd.

Ramsey (HUNTINGDONSHIRE).—Houses (32), on five sites; V. J. Bateman, U.D.C. surveyor.

Redcar.—Houses (12), Thames Road; E. & F. A. Picknett. Amusement Palace, Esplanade; T. R. Bestwick.

St. Albans.—Laundry, Oster House Institution (£5,860); J. T. Bushell, Ltd.

Seaton Valley.—Houses (132), Hartley; surveyor, Shiremoor.

Sheffield.—Cinema, Norfolk Street, for Odeon Theatres, Ltd.; H. W. Weedon, architect, 84, Colmore Row, Birmingham.

Skelton.—Concrete works for the Cleveland Stone Products, Ltd.; H. C. Garbutt, architect, 18, Albert Road, Middlesbrough.

South Shields.—Flats (227); J. Reid, borough engineer.

Stoke-on-Trent.—Cinema, High Street and Westley Street, Goldenhill, for a local syndicate; A. Cotton, Son & Hulme, architects, 53, Piccadilly, Tunstall.

Surrey.—Schools, Molesey; Holliday & Greenwood, Ltd., builders, 11, Buckingham Palace Gardens, London, S.W.1.

Sussex.—Schools, Rustington, Southbourne, Storrington, and West Thorney; county architect, Chichester.

Swansea.—Houses (124) and flats, Maes-y-Celmyn estate, and education offices, Dynevor Place (£9,584); borough architect.

Swindon.—Houses (12), Sunnyside Avenue; Pope Bros.

Thirsk.—Houses and bungalows, Sowerby, for R.D.C.; C. W. C. Needham, 3, Duncombe Place, York.

Tottenham.—Schools (£26,000), Brook Street, Bruce Grove, for Rev. Father Sowerby; L. H. Hiscock, architect, High Street, Guildford.

Wakefield.—Extensions to works, New Wells; Drake & Warters.

Wallsend-on-Tyne.—Development of Westmoreland estate; Smith, Gore & Co. Maternity and child welfare centre, The Green, for the T.C.; borough engineer. School for St. Aidan's (£23,678); R. Thompson.

Warrington.—Houses (156), Hallows Avenue; R. & S. Smith.

Washington (Co. DURHAM).—Houses (40); H. Reilly, contractor, 4, Wellbank Road.

West Hartlepool.—Houses (141), Hart Lane; Watt Bros., builders, 210, Park Road.

Wombwell.—Houses (74), Wentworth Road, Jump; U.D.C. surveyor.

Yorkshire.—School, Redcar Lane, Redcar, for the North Riding E.C.

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 15th:—

Foster. No. 581729. Class 8. Pyrometers, thermometers and strainmeters.—Foster Instrument Co., Ltd., Letchworth, Herts.

Stassfurter (lettering and design). No. 582000. Class 8. Wireless, telegraphic and telephonic apparatus and parts thereof.—Stassfurter Rundfunk Gesellschaft, Stassfurter, Saxony, Germany (British representatives, Page, White and Farrer, 27, Chancery Lane, W.C.2).

Tempovox. No. 584547. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—British Tempovox, Ltd., Tempovox Works, Holly Road, Hampton Hill, Middlesex.

Pneumostat. No. 585182. Class 11. Hand and electrically operated inhalers (not medicated).—Francis Riddell, Ltd., Axtell House, Warwick Street, Regent Street, W.1.

Traffodol. No. 585501. Class 50. Compositions consisting principally of oils sold in liquid form for electrical insulation purposes.—Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, W.C.2.

Fantom Fast.—In our issue of June 10th this mark and the name of the applicants were incorrectly given. The name of the company is the National Marking Machine Co. and the word "Fantom" is as now spelt.

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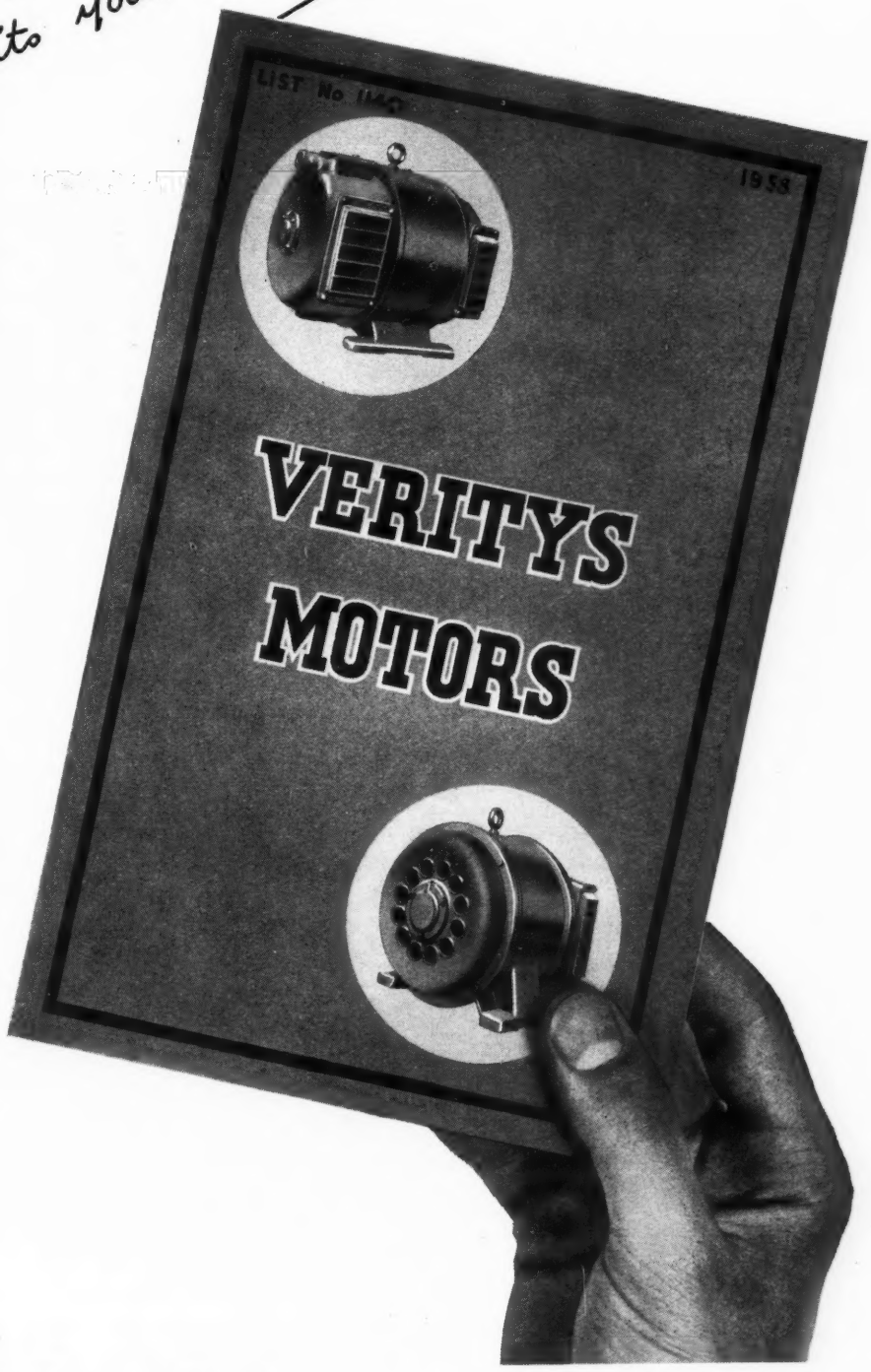

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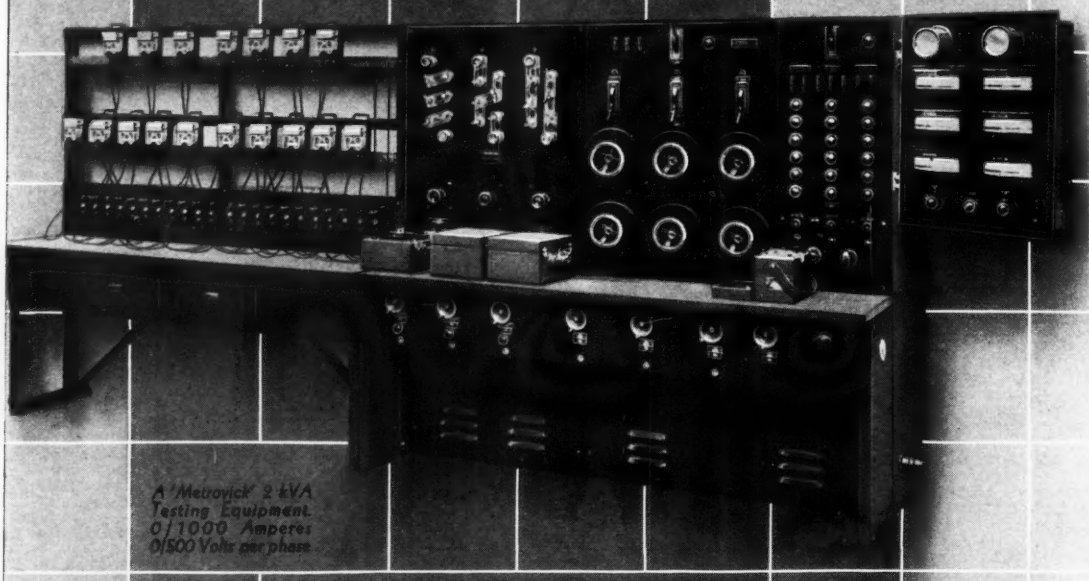

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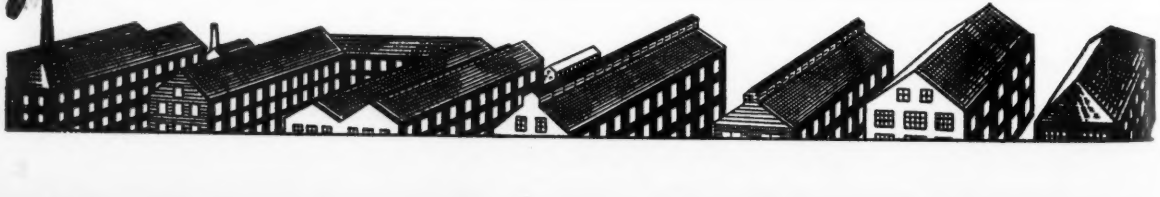

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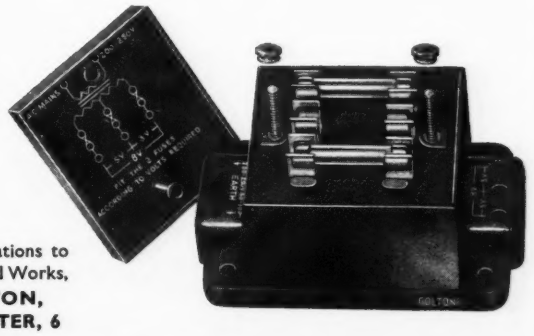

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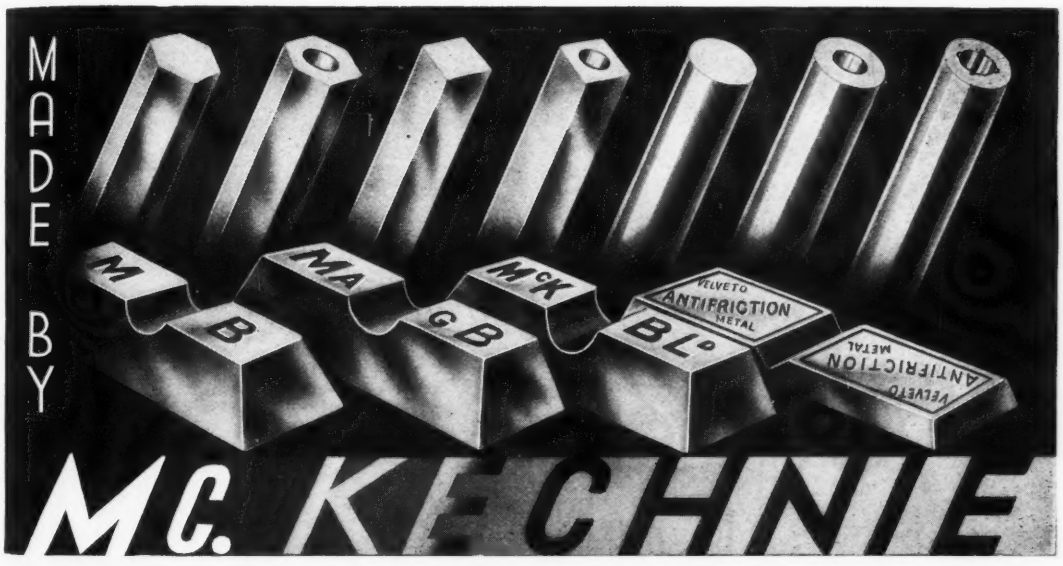

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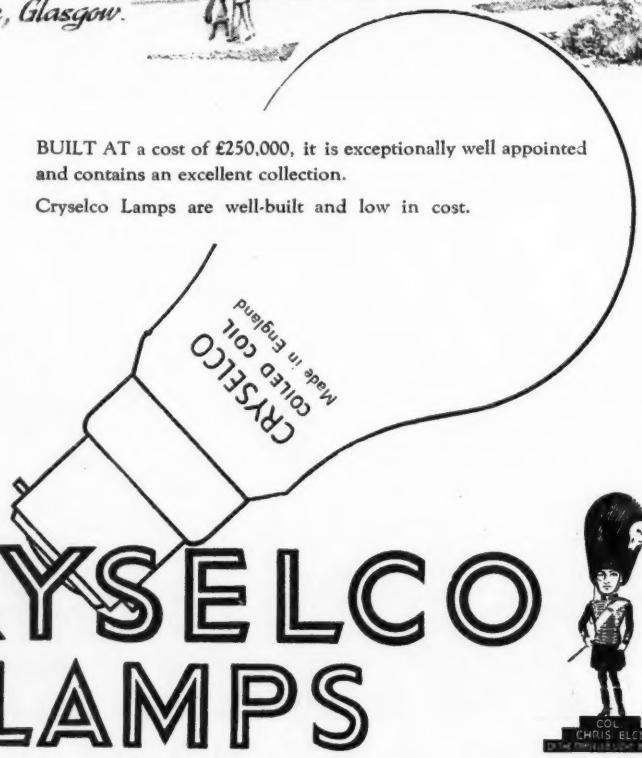

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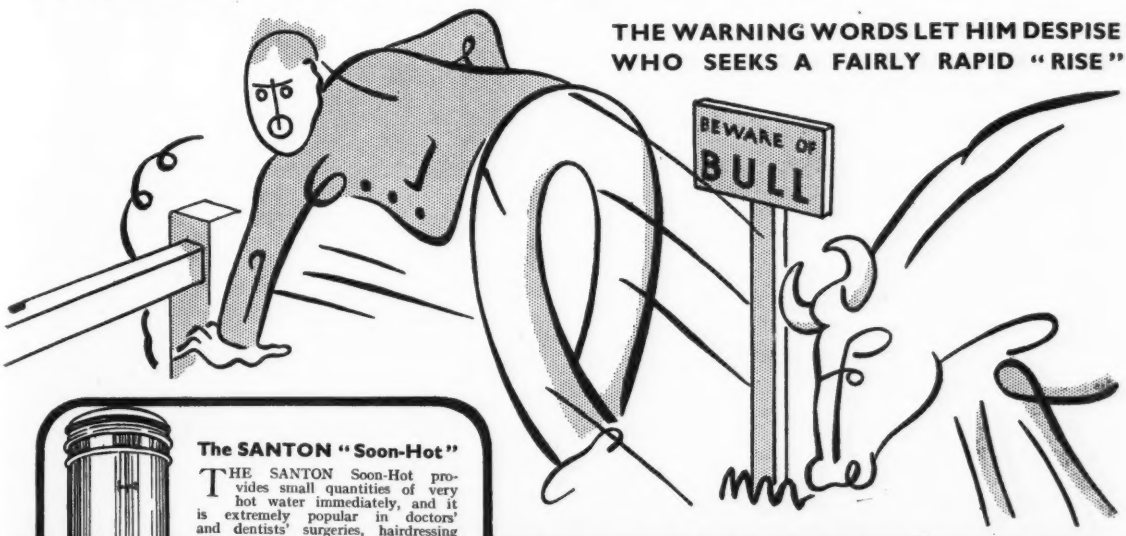

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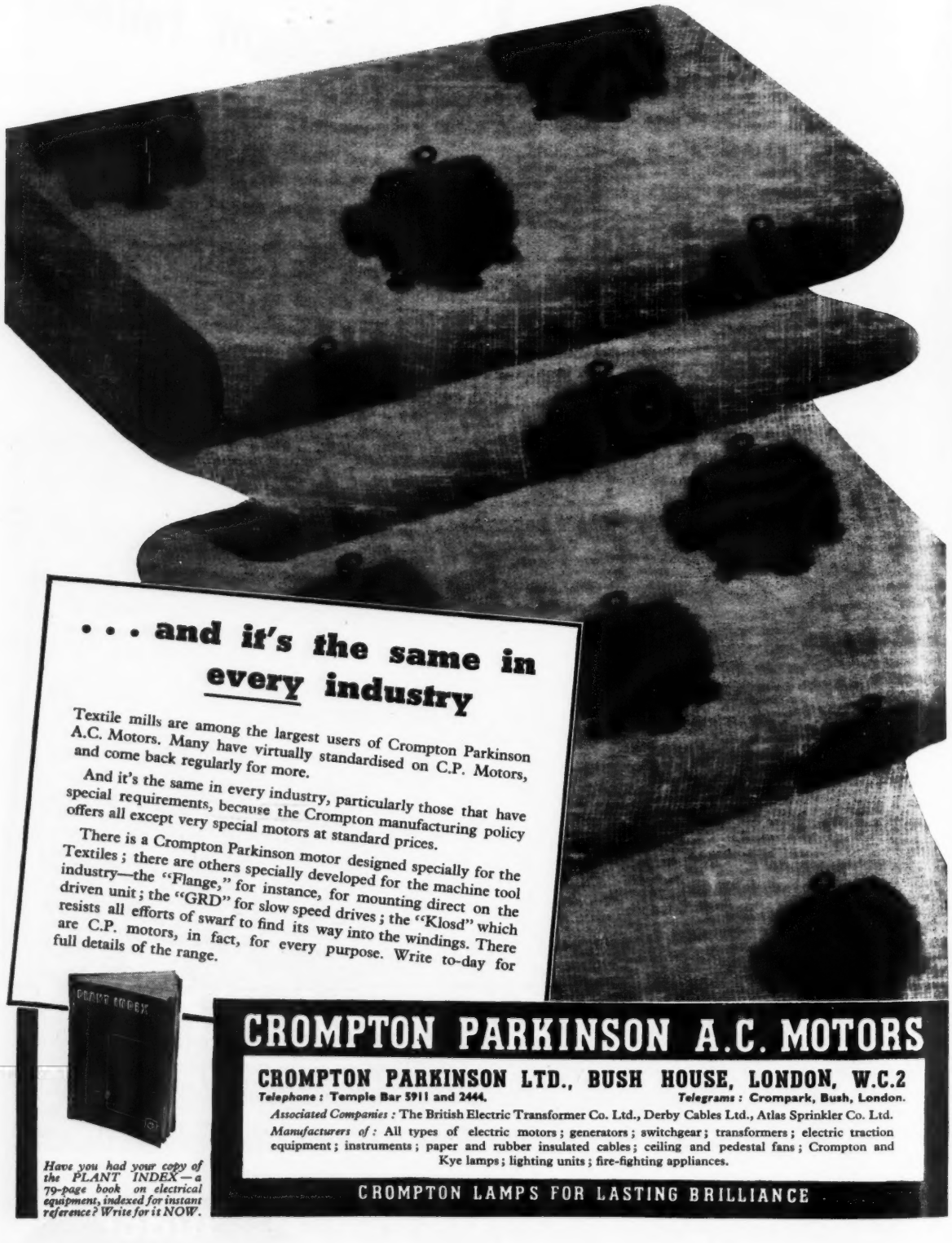

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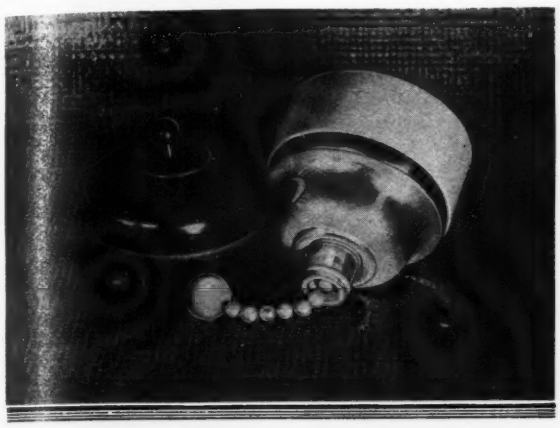

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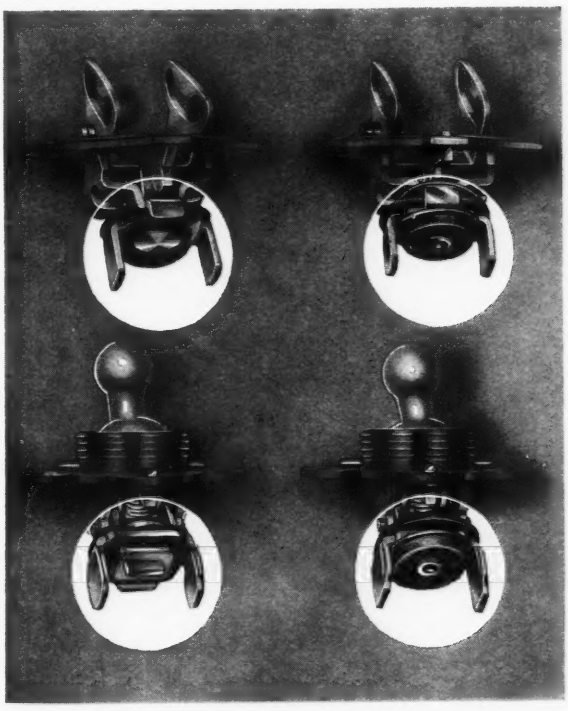

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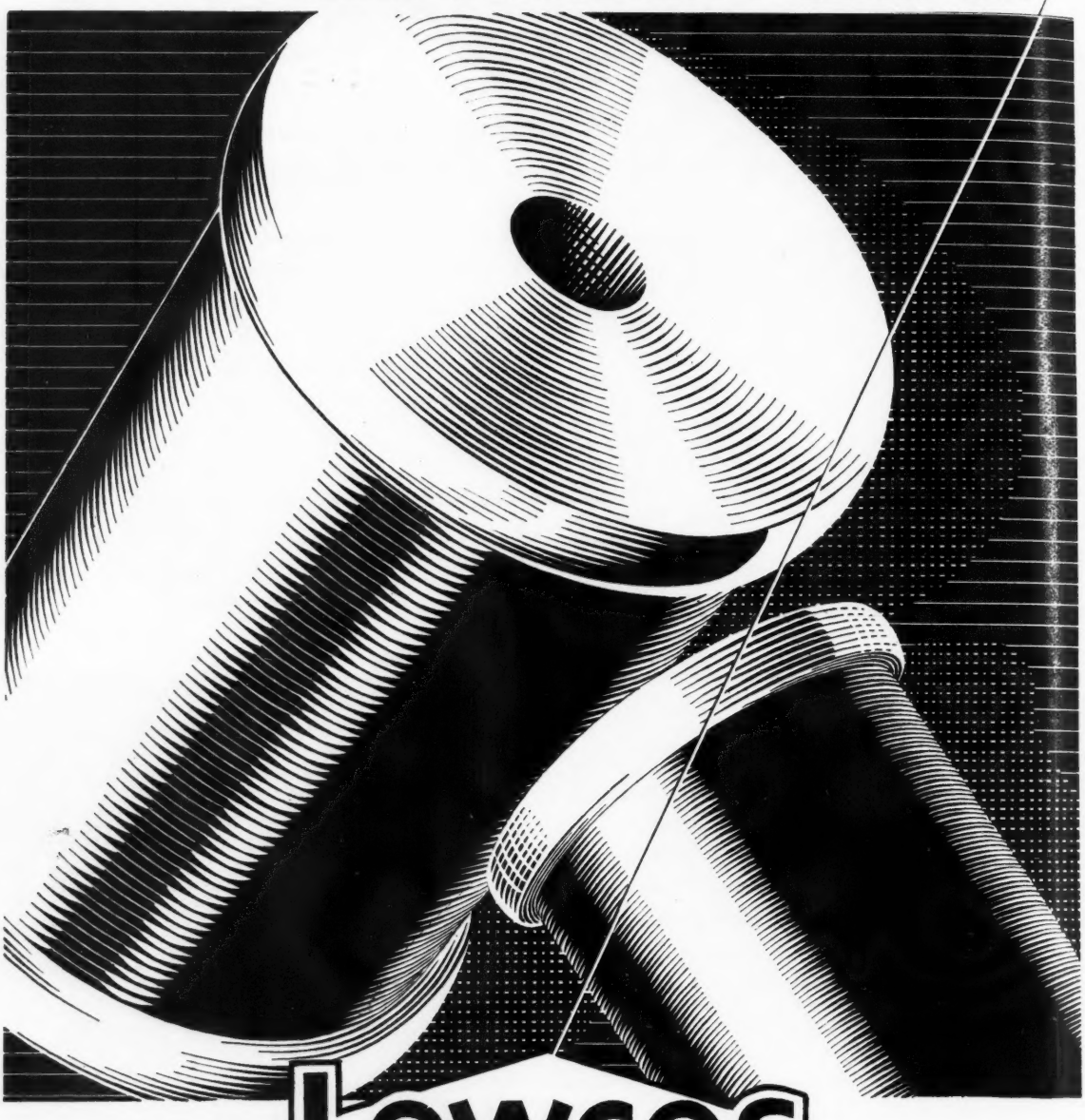

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PAPER INSULATED WIRES AND STRIPS,
ASBESTOS INSULATED WIRES,
TELEPHONE CORDS, WIRES AND CABLES,
RESISTANCE WIRES (EUREKA AND NICKEL CHROME),
BELL WIRES.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED CHURCH ROAD, LEYTON, LONDON, E.10.

Fine-Quality gives
PROSPERITY

No. 916 **19/6**

Chromium Plate

Over the patchy past and uncertain present; through the good years and bad, "Premier" Fine-Quality has been responsible for an ever-increasing volume of business. Because "Premier" Fine-Quality means the virtual absence of maintenance costs and irritating service charges, dealers have had the full benefits that increased trading has brought them.

They have been able to appreciate that to—

PROSPER WITH PREMIER

is no empty catch phrase.

If by any chance you are not acquainted with the truth of this, write for the "Premier" Catalogue.

PREMIER

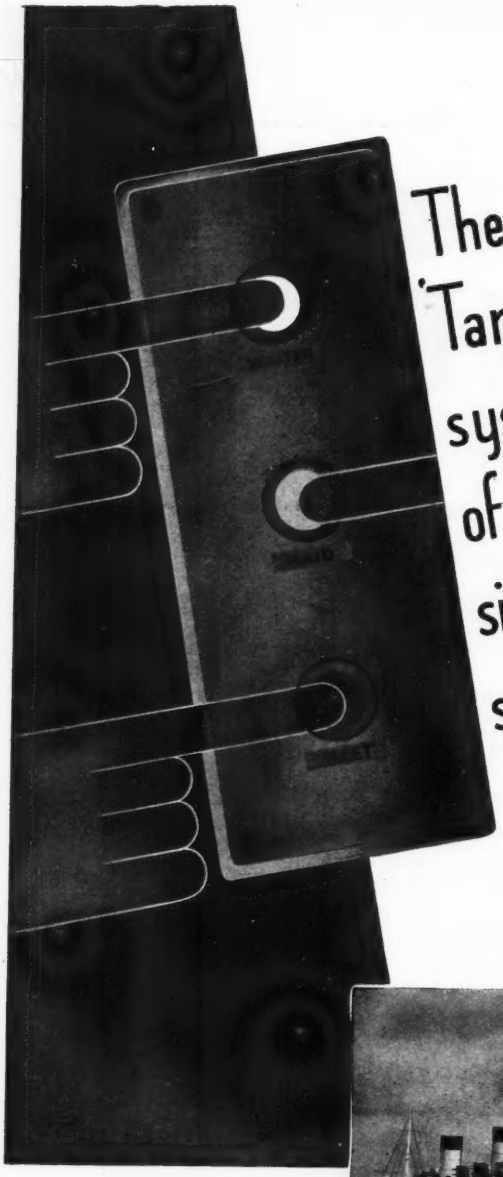
Reflector Fires from 16/6. Upright-type Fires from 19/-. Bowl Fires from 11/6. "Coal" Fires from 90/-. Inset Fires.

"Laundwell" Irons from 13/-. "Smooth-well" Irons from 15/6. "Jewel" Irons from 9/6. "Super-Smoothwell" (auto-control) Irons. Laundry Irons.

"Quickset" Kettles, and "Accident-Proof" Kettles from 24/6. Coffee Percolators. Toasters. Egg Boilers. "Multi-Boilers." Hotplates. Glue Pots, etc.

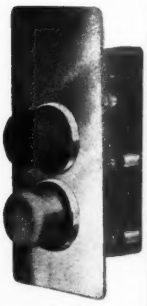
PREMIER ELECTRIC HEATERS LIMITED, BIRMINGHAM, 9.

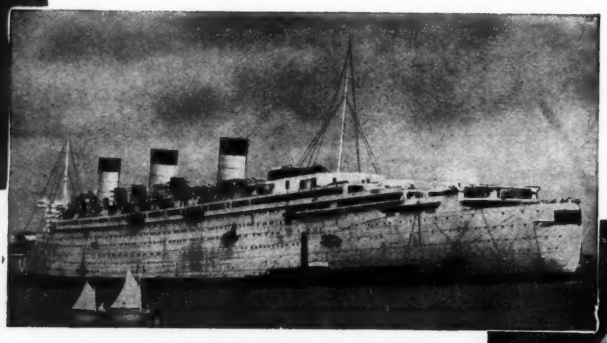
Telephone: Victoria 2104 (5 lines). Telegrams: FAHRENHEIT, Birmingham. London Office: 203, Bush House (Centre Block), Aldwych, W.C.2. Telephone: Temple Bar 2903.



The 'Tangent' system of silent service

ON LAND & SEA
AT HOME & ABROAD





R.M.S. "QUEEN MARY." Entire passenger accommodation equipped with the

TANGENT
LUMINOUS CALL SYSTEM

For silent communication between guests and staff.

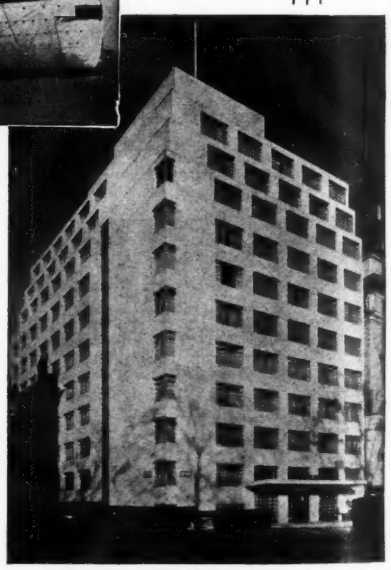
R.M.S. "Queen Mary"; Athenæum Court, London; Langham Hotel, London; St. Mary's Hospital, London; Bart's Hospital, London; Canniesburn Hospital, Glasgow; Royal Infirmary, Edinburgh; L.N.E.R. Hotel, York and Newcastle-on-Tyne; Frodsham Sanatorium, Liverpool; Iraq Hospital—to mention but a few recent contracts—all are equipped according to their needs with this MODERN SYSTEM.

The equipment offers many unusual advantages and a wide range of fittings is available.

Your enquiry right from the outset will receive the keen and expert attention of a firm who have been in the electrical business for over 60 years.

GENTS' OF LEICESTER
Estab. 1872

London Office & Showrooms: 47 Victoria Street, S.W.1
Newcastle-on-Tyne Office & Showrooms: Tangent House, Leazes Park Road



Athenæum Court, Piccadilly, London, designed by Adie, Button & Partners
Electrical Contractors:—Troughton & Young.

GENT & CO. LTD., FARADAY WORKS, LEICESTER.

TANGENT

BRITISH EMPIRE

"KEY"
FIBRE CONDUIT

MADE IN CANADA AND COMPLETED AT OUR WORKS IN MANCHESTER

EXTREMELY EASY TO LAY

NO PROJECTION AT JOINTS

LONG LENGTHS —FEW JOINTS

PERFECT ALIGNMENT

DELIVERY FROM STOCK

ALL BRITISH EMPIRE

USED IN THIS COUNTRY FOR OVER 33 YEARS

THE KEY ENGINEERING COMPANY, LIMITED

4, Queen Victoria Street,
Mansion House Buildings,
LONDON, E.C.4.

Telephone No. 2235 City, London.
Telegrams—"KEYPOINT, CANNON, LONDON."

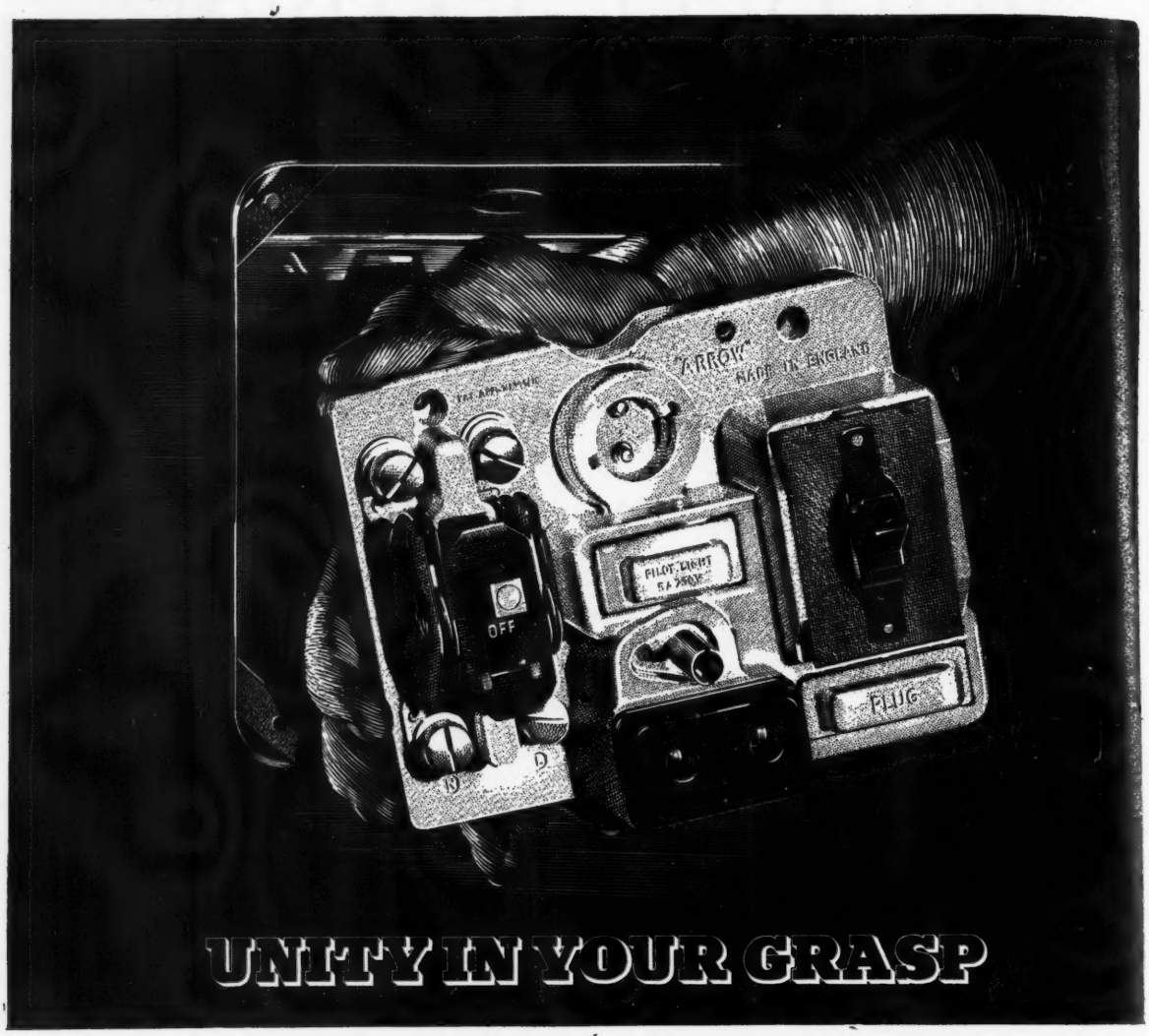
Works:
Trafford Park,
MANCHESTER, 17.

Elevator Road,
Trafford Park,
MANCHESTER, 17.

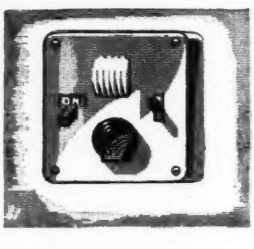
Telephone No. 1903 Trafford Park, Manchester.
Telegrams—"KEYPOINT, MANCHESTER."

A.B.C. Code, 5th Edition and Bentley's.

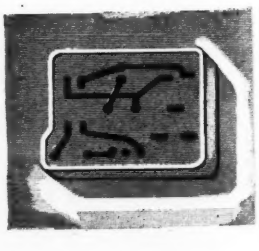
ARROW COOKER CONTROL UNIT



1. ALL component parts (switches, socket, fuses, etc.) together with interconnections (effected by brass shunts) mounted on one easily removable porcelain base (held by 3 screws only).



2. HOUSING. Pressed Steel Box—stove enamelled with cover plate in Arrow K.3 special untarnishable and rust-proof finish.



3. Simpler wiring. Cable entries directly opposite "easy-wire" slotted terminals and ensuring straight-through passage for leads.

The Good Companion to the modern Cooker—and as attractive in appearance as it is in its competitive cost.

ARROW ELECTRIC SWITCHES LTD.

HANGER LANE, LONDON, W.5.

'Phone: Perivale 4451

'Grams: Arroswitch, Ealux, London

A Modern Work of Art

The Yorkshire Power Company MODEL WORKING KITCHEN, Thornhill Power Station —EQUIPPED EXCLUSIVELY WITH MOFFAT COOKERS & REFRIGERATORS

MOFFAT

Modern as well as practical, with built-in cupboards and working surfaces at a convenient height, the new model kitchen of the Yorkshire Electric Power Company is a splendid example of the finest in modern kitchen planning.

We are proud that Moffat Electric Cookers and Moffat Electric Refrigerators have been chosen as integral parts of the whole scheme. Their up-to-date streamline design, general efficiency, ease of operation and gleaming porcelain enamel finish, make them especially suitable for a kitchen of this kind.

★ *The Cookers are Moffat 265-7 De-Luxe Table Top Models with five high speed boiling plates at the back and insulated Monel Metal working surface in front. Each cooker has two large "CIRCULAIRE" fresh air, even heat ovens, fitted with the reliable Moffat Thermomatic oven heat control.*

★ *The Refrigerators are Moffat M-66 porcelain enamel finish models, with ful-dor front, convenient dor-shelf racks, triple seal door gasket, toe-tip door release, scientific shelf arrangement and interior light.*

MOFFAT

ELECTRIC COOKERS AND REFRIGERATORS

MOFFATS LIMITED BLACKBURN LANCS

F. John Roe, A.A

RISK !

REDUCING IT *is not enough*

it must be **ELIMINATED** *with* **"FISH SPINE" BEADS**

The original "Fish Spine" bead gives the most *complete* protection that is possible—and in the simplest way. That it is a standard among the world's most *important* users is significant evidence of its superior electrical, mechanical and thermal characteristics. Many attempts at imitation have appeared, but we feel we are right not to sacrifice general efficiency for cheapness—no risk can be worth your while that involves even the slightest chance of damage to your machine or apparatus. We have an interesting booklet on bare wire insulation—

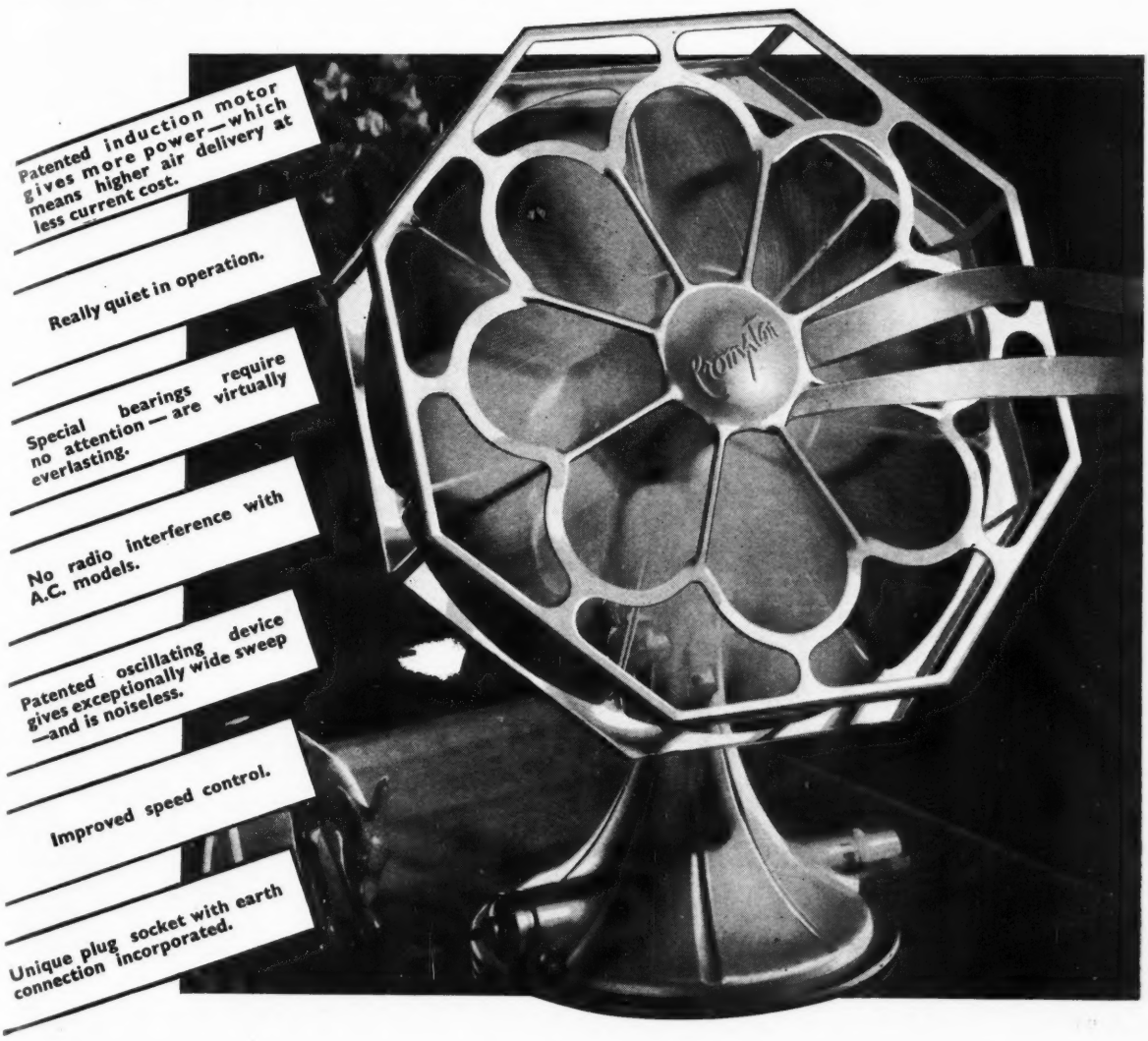
WRITE FOR A FREE COPY

TAYLOR TUNNICLIFF PORCELAIN

Taylor Tunnicliff & Co., Ltd. Head Office: Eastwood, Hanley, Staffs. London: 110 *Cannon Street, E.C.4. Factories at Hanley, Stone & Longton, Staffs. Telephone: Mansion House* 7211-2 *& Stoke-on-Trent* 5272-4.

40 YEARS OF FAN MAKING EXPERIENCE HAVE GONE INTO THIS!

Crompton Fans are first-class engineering jobs. In their design and construction, every opportunity for advancing efficiency has been carefully studied and worked out to its most practicable end. Below is the list of advantages Crompton Fans offer. Study them. They are points which make the selling of Crompton Fans easy. In addition, note the beauty of the Crompton Fan—its smart satin-silver finish—its graceful sweep of line. There are no finer fans made than Crompton—none easier to sell.


Patented induction motor gives more power—which means higher air delivery at less current cost.
Really quiet in operation.
Special bearings require no attention—are virtually everlasting.
No radio interference with A.C. models.
Patented oscillating device gives exceptionally wide sweep —and is noiseless.
Improved speed control.
Unique plug socket with earth connection incorporated.
Crompton

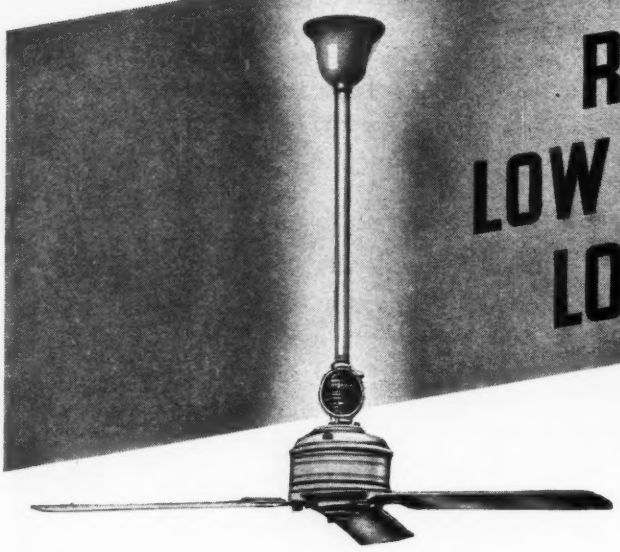
it's a CROMPTON FAN

CROMPTON PARKINSON LTD., BUSH HOUSE, LONDON, W.C.2. Telephone: Temple Bar 5911 & 2444

G.E.C.
ELECTRIC FANS

for

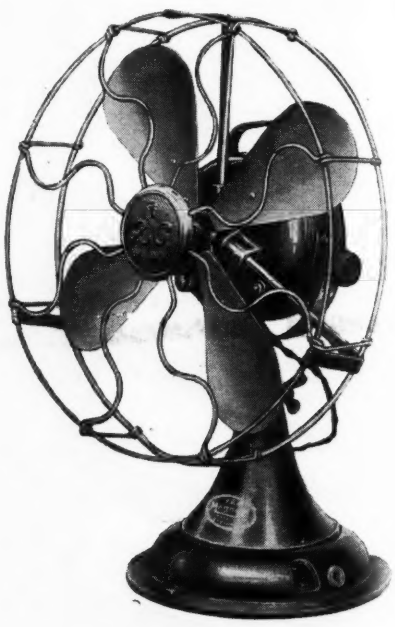
RELIABILITY
LOW MAINTENANCE
LONG SERVICE



FULL RANGE OF CEILING TYPES

Secure your share of profitable Fan Sales this Season. Push G.E.C. Electric Fans !

Early deliveries from all G.E.C. branches.



LOW WATTS
HIGH AIR DELIVERY

Made in England

TABLE FANS FROM £9

SEE OUR EXHIBIT

EMPIRE EXHIBITION
PALACE OF ENGINEERING

THE GENERAL ELECTRIC CO., LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

ONE OF THE J.&P. PAGES

Photo by permission of "Daily Mail."

LIGHTNING OVER LONDON

FOR ADEQUATE LIGHTNING

PROTECTION INSTAL CRYSTAL

VALVE LIGHTNING ARRESTERS

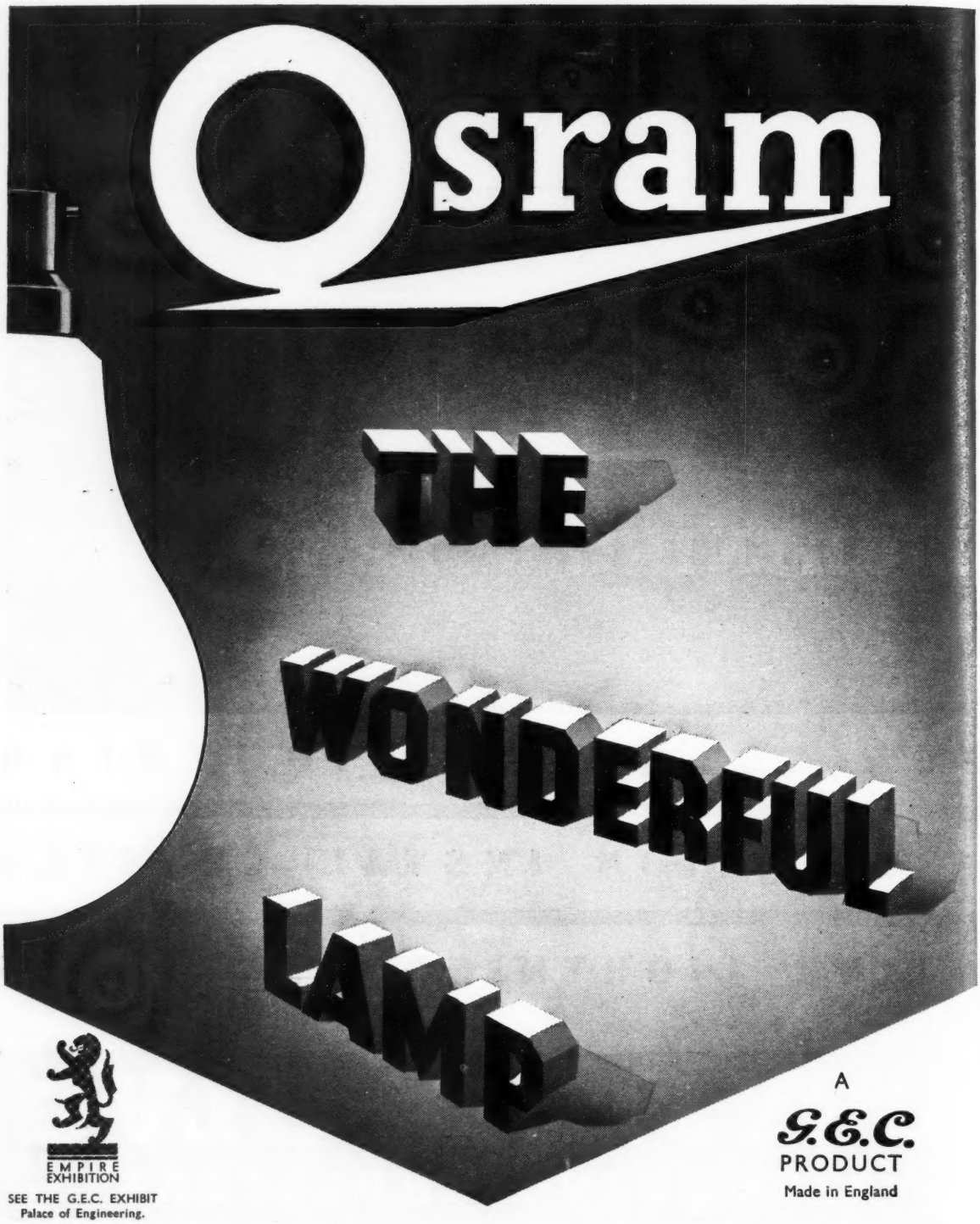
CRYSTAL VALVE
LIGHTNING ARRESTERS

JOHNSON & PHILLIPS LTD.

Charlton, London, S.E.7

The mark that means that "little more" in quality

H



EMPIRE EXHIBITION
SEE THE G.E.C. EXHIBIT
Palace of Engineering.

A
G.E.C.
PRODUCT
Made in England

A wonderful line too, for your business. *Osram pulls profits, makes friends, builds goodwill. Customers come back again for Osram. They know the name. They know the reputation. They appreciate the generous gift of up to 20% extra light (without using more electricity). Recommend Osram Coiled Coil always—for all-round satisfaction.*

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT OR SITUATIONS WANTED.
Advertisements under these headings, if prepaid, are inserted at the rate of one penny per word (minimum 1s.). A box number counts as six words. (6d. extra charged for postage of replies.) If placed to account, the charge for each insertion is 2s. 6d. for three lines and 9d. for each additional line.
Three insertions—under the above headings only—can be secured for the price of two, if ordered and prepaid with the first insertion.
Original testimonials should not be sent with applications for employment.
Replies to Situations Vacant advertisements, published under a box number, if not to be delivered to any particular firm or individual, should be accompanied by instructions to this effect, addressed to The Manager of THE ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants in such cases cannot be returned to them. In no case will the name of an advertiser using a box number be disclosed.
Displayed advertisements :—14s. per inch (minimum one inch). (Three insertions at the cost of two if ordered and prepaid with the first insertion.)

"FOR SALE," "ARTICLES WANTED," "AGENCIES," "PARTNERSHIPS," etc.
Advertisements under these headings are inserted at the rate of 1s. 9d. per line per insertion. (This applies to all headings other than Situations Vacant or Wanted.)
Displayed advertisements :—14s. per inch (minimum one inch).

AUCTION NOTICES. 14s. per inch (minimum one inch).

ALL REPLIES TO BOX NUMBERS should be addressed to the Box Number, c/o THE ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED ADVERTISEMENTS must reach us by **5.30 p.m.** on **TUESDAY.**

OFFICIAL NOTICES.—TENDERS, ETC.

BOROUGH OF HESTON AND ISLEWORTH.

Electricity Department.

TENDER FOR CABLES AND TRANSFORMER.

TENDERS are invited for the supply and delivery to a site within the Borough of Heston and Isleworth of :—

(a) 1 600-kVA TRANSFORMER.
(b) E.H.T. P.I.L.C.D.S.T.A. CABLE AND L.T. PILOT CABLE.

Specifications and Forms of Tender may be obtained on application to Mr. S. H. Fowles, M.I.E.E., M.I.Mech.E., Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow.

Additional copies of the Specifications and Forms of Tender may be obtained upon payment of a fee (which is not returnable) of 10s. 6d. per copy.

Tenders in plain sealed envelopes, endorsed

(a) TENDER FOR 1 600-kVA TRANSFORMER; or
(b) TENDER FOR CABLES

as the case may be, must be delivered to me by noon on Tuesday, 5th July, 1938, and the envelope must not bear any name or mark indicating the sender. Tenders which do not comply with this requirement will not be considered.

The Council do not bind themselves to accept the lowest or any tender, and reserve the right to accept the whole of a tender or any part thereof.

HAROLD SWANN,
Town Clerk.

Council House,
Hounslow. 1452

BOROUGH OF NUNEATON—ELECTRICITY DEPARTMENT.

Kiosk Sub-station.

TENDERS are invited for the Supply, Delivery and Erection of one Kiosk Sub-station complete with E.H.T. and L.T. Switchgear and 300 kVA Transformer.

Tenders will only be considered from Manufacturers whose Switchgear has been type-tested for rupturing and making capacity. Specification and form of Tender may be obtained from the undersigned upon receipt of a stamped, addressed brief size envelope. Further copies of the Specification and Form of Tender may be obtained on receipt of remittance of 2s. 6d. per copy, which should be enclosed with application and will not be returned. Sealed Tenders in plain envelopes endorsed "Tender for Kiosk" and addressed to "The Town Clerk, Nuneaton," will be received up to 12 noon on Wednesday, July 6th, 1938.

The Council does not bind itself to accept the lowest or any Tender.

S. CAMERON GIBSON, M.I.E.E.,
Borough Electrical Engineer.

The Council House,
Nuneaton. 1454

ELECTRICITY SUPPLY BOARD, IRELAND.

THE Electricity Supply Board invites Tenders for the supply, delivery and erection of :—

FOUR 15,000 kVA TRANSFORMERS, 110,000/38,000 VOLTS, WITH ON-LOAD TAP-CHANGING EQUIPMENT,

at the Board's Transformer Stations at Waterford, Dundalk and Carrick-on-Shannon.

Conditions of Tendering, Form of Tender, Conditions of Contract and Specification may be obtained by Contractors from the Chief Design Engineer, Electricity Supply Board, 37, Merrion Square, Dublin, C.18, by application and on payment of a fee of Three Guineas, which will be refunded on receipt of a Bona-fide Tender. Additional copies may be purchased at a cost of One Guinea per copy (non-returnable).

Tenders with all the relevant documents enclosed in a sealed cover endorsed "TENDER FOR 15,000 kVA TRANSFORMERS—SPECIFICATION No. 173D," must be delivered to the undersigned not later than 12 o'clock noon on the 6th August, 1938.

The Board does not bind itself to accept the lowest or any Tender.

PATRICK J. DEMPSEY,
Secretary.

Electricity Supply Board,
60-62, Upper Mount Street,
Dublin, C.18. 1450

COUNTY BOROUGH OF SOUTHAMPTON.

Electricity Department.

TENDERS are invited for the supply and delivery of 11 kV, 6.6 kV, 1,000-volt and Telephone Cables.

Conditions of Contract, Specification and Form of Tender may be obtained from Mr. W. G. Turner, Borough Electrical Engineer, Civic Centre, Southampton, by application and on payment of a fee of £1 1s., which will be refunded on receipt of a bona-fide tender. Additional copies may be purchased at a cost of 10s. 6d. each.

Sealed tenders, endorsed "Cables," must be delivered to the undersigned not later than noon on Tuesday, 5th July, 1938.

The Council does not bind itself to accept the lowest or any tender.

R. RONALD H. MEGGESON,
Town Clerk.

Civic Centre,
Southampton.
16th June, 1938. 1443

COUNTY BOROUGH OF DEWSBURY.

Electricity Undertaking.

L.T. SWITCHGEAR.

TENDERS are invited for the supply and erection of a Low Tension 3 phase, 4 wire, 15 way Sub-station Distribution Board.

Specification and Form of Tender (extra copies 2s. 6d. each) can be obtained from R. W. Grubb, M.I.E.E., Borough Electrical Engineer, Bradford Road, Dewsbury.

Tenders, in plain sealed envelopes endorsed "L.T. Switchgear," to be delivered to the undersigned, by first post Tuesday, July 5th, 1938.

HOLLAND BOOTH,
Town Clerk.

Town Hall,
Dewsbury.
21st June, 1938. 1446

OFFICIAL NOTICES.—TENDERS, ETC.—*Contd.*

CORPORATION OF BRISTOL.

Electricity Department.

THE Corporation of Bristol are prepared to receive TENDERS for the SUPPLY and DELIVERY of :—

(a) 6.6-kV TRANSFORMERS.
(b) Fully Automatic Low Tension FEEDER VOLTAGE REGULATORS.

Copies of the Specification may be obtained from the undersigned on payment of a DEPOSIT of TWO GUINEAS, which amount will be returned on receipt of a bona-fide Tender.

All remittances should be made payable to the "Corporation of Bristol."

Tenders, endorsed "TRANSFORMERS and L.T. VOLTAGE REGULATORS," must be delivered in plain envelopes addressed to the undersigned not later than 12 noon on MONDAY, the ELEVENTH DAY of JULY, 1938.

The lowest or any Tender will not necessarily be accepted.

A. J. NEWMAN, M.I.Mech.E., M.I.E.E.,
Chief Engineer and General Manager.

Electricity Offices,
Colston Avenue, Bristol, 1. 1479

HORSHAM URBAN DISTRICT COUNCIL.

Electricity Department.

THE above named Council invite Tenders for

One Steel Kiosk Transformer Sub-Station.

Further particulars and Specification may be obtained from the Electrical Engineer, Electricity Works, Stanley Street, Horsham, Sussex. Applications from actual manufacturers only will receive attention.

Sealed Tenders, endorsed "Kiosk," in plain envelope, must be addressed and, to reach the undersigned not later than 12 noon on July 4th, 1938.

The Council do not undertake to accept the lowest or any Tender.

A. SLYFIELD,
Clerk to the Council.

Council Offices,
Horsham Park,
Horsham,
Sussex.
17th June, 1938. 1481

BOROUGH OF BRIDPORT.

Electricity Department.

OVERHEAD LINES.

TENDERS are invited for the supply, delivery and erection of about 4½ miles of 6,600 volt overhead lines, together with a section of 230/400 volt lines.

Specification and Form of Tender may be obtained from the undersigned on payment of a fee of Two Guineas, which will be returned on receipt of a bona fide tender.

Tenders must be enclosed in plain envelope, sealed and endorsed "Tender for Overhead Lines," and addressed to S. Edgar Howard, Esq., Town Clerk, Bridport. Tenders must be received not later than noon on Wednesday, 13th July, 1938.

H. F. CASTLE,
Borough Electrical Engineer.

32, South Street,
Bridport. 1504

BOROUGH OF BEXHILL.

Electricity Department.

ELECTRICITY SUPPLY (METERS) ACT, 1936.

THE Council invite Tenders for the supply and delivery of Meter Testing Equipment and Instruments.

Only tenders from bona fide British Manufacturers will be considered.

Specification, together with Form of Tender, may be obtained from the Electrical Engineer, Electricity Works, Ashdown Road, Bexhill-on-Sea.

Tenders, enclosed in plain sealed envelopes addressed as instructed on Form of Tender, to be delivered to the undersigned not later than first post Tuesday, 5th July, 1938.

The Council does not bind itself to accept the lowest or any tender.

S. J. TAYLOR,
Town Clerk.

Town Hall,
Bexhill-on-Sea.
20th June, 1938. 1505

OFFICIAL NOTICES.—TENDERS, ETC.—*Contd.*

COUNTY BOROUGH OF SOUTHEND-ON-SEA.

To Heating Contractors and Electrical Contractors.

MUNICIPAL HOSPITAL, ROCHFORD, ESSEX.
(ENGINEERING WORKS).

THE Corporation of Southend-on-Sea propose to invite tenders from suitable contractors for the execution of the undermentioned works in connection with the erection of a Municipal Hospital now proceeding at Rochford, Essex :—

(a) The supply and erection of central boiler plant, heating, domestic hot and cold water supplies, kitchen equipment, fire services, and works incidental thereto;
(b) A complete electrical installation, comprising standby generating set, power and lighting wiring, lifts, electric cooking, telephones, wireless, Staff locators, and other auxiliary services.

The Hospital buildings consist of a large Nurses' Home, Children's Block, Maternity Block, Separation Block, Tuberculosis Block, Block for Pneumo-Thorax, Administration Buildings (including Offices, Resident Medical Officers' Quarters, Stores, Staff Dining Rooms and a large kitchen), Boiler House, Mortuary, and Admission Block, together with other incidental buildings.

Contractors desirous of tendering should apply in writing to the undersigned at his Office, Municipal Buildings, Southend-on-Sea, not later than 9th July, 1938, giving particulars of similar works carried out by them with dates and values of contracts.

Only contractors of repute who are able to satisfy the Corporation of their ability to execute the contracts should apply.

The contractors selected to tender will in due course be furnished with the appropriate plans and documents and they will be required to deposit with the Corporation a fee of five guineas, which will be refunded upon receipt of a bona fide tender and the return of all loaned documents. No remittances should accompany the preliminary applications.

The Corporation do not bind themselves to accept the lowest or any tender.

R. G. Baxter, Borough Engineer; Frank W. Smith, A.R.I.B.A.; Leslie Turner, Consulting Constructional Engineer; Wingfield-Bowles and Partners, Consulting Heating Engineers; E. W. Dorey, Consulting Electrical Engineer; and Widnell and Trollope, Quantity Surveyors.

Town Clerk's Office,
Municipal Buildings,
Southend-on-Sea.
June, 1938.

H. J. WORWOOD,
Town Clerk.
1509

METROPOLITAN BOROUGH OF HAMMERSMITH.

Electricity Department.

SUPPLY OF SWITCHGEAR.

THE Borough Council invite tenders for the supply, delivery and erection of E.H.T., 3-PHASE, 11,000-V METAL-CLAD SWITCHGEAR (250,000 kVA).

Specification and Form of Tender may be obtained from the Chief Electrical Engineer, "Electric House," 154, Uxbridge Road, W.12, upon receipt of a stamped addressed brief envelope. Where additional copies are required, a remittance of 2s. 6d. each must be forwarded.

Sealed tenders in plain envelopes, endorsed "Tender for Switchgear," must be delivered to the *undersigned* at the TOWN HALL, HAMMERSMITH, W.6, not later than 12 noon on MONDAY, 4th JULY, 1938.

The Council does not bind itself to accept the lowest or any tender.

HUGH ROYLE,
Town Clerk.

Town Hall, Hammersmith, W.6.
21st June, 1938. 1515

BOROUGH OF WATFORD.

Electricity Supply.

TENDERS are invited for an Extra High Tension, 6,600 volts, 8-Panel (250,000 kVA) Switchboard.

Specification and full particulars can be obtained from the undersigned on payment of 10s. 6d., which sum will be refunded on receipt of a bona fide tender.

ARTHUR W. BARHAM,
Chief Engineer and General Manager.

Electricity Offices,
Cardiff Road, Watford.
21st June, 1938. 1527

OFFICIAL NOTICES.—TENDERS, ETC.—*Contd.*

BOROUGH OF NEWCASTLE-UNDER-LYME.

Highways Committee.

STREET LIGHTING.

THE Corporation invite tenders from reliable Contractors for the supply and erection of:—

280 High Power Mercury Vapour and/or Gas Filled Lamps, Lanterns, Fittings, and Columns erected complete in several streets within the Borough.

Applications for Specification, Quantities, and Form of Tender, accompanied by a deposit of £2 in Treasury notes (which will be returned on receipt of a bona fide tender) must be made to the Borough Surveyor, Municipal Offices, Nelson Place, Newcastle, Staffs.

The successful contractors will be required to conform to the Standing Orders of the Council relating to Contracts.

Tenders are to be delivered to the undersigned not later than 12 noon on Tuesday, July 19th next.

No Tender will be considered except in a plain sealed envelope endorsed "Tender—Street Lighting," and no envelope shall bear any name or mark indicating the sender.

The lowest or any tender will not necessarily be accepted.

J. GRIFFITH,
Town Clerk.

District Bank House,
Newcastle, Staffs.
21st June, 1938. 1516

IRAN.

TENDERS are invited by the Ministry of Industry and Mines of Iran for a complete Turbo-Electric Power Plant, Boilers, Compressors and other mining material for the coal mine at Zarabe. Specifications may be obtained on application to the Commercial Attaché to the Imperial Iranian Legation, Ling House, 10/13, South Street, London, E.C.2. 1521

SITUATIONS VACANT.

COUNTY BOROUGH OF SWANSEA.

Appointment of Borough Electrical Engineer.

APPLICATIONS are invited for the position of Borough Electrical Engineer and General Manager of the Corporation's Electricity Undertaking. The commencing salary will be £1,800 per annum rising by two annual increments of £100 each to a maximum of £2,000, subject to satisfactory service.

The post will be superannuable under the Local Government Act, 1937. The Corporation has not yet adopted a superannuation scheme but is at present considering the adoption of a scheme either under the Local Government Officers Superannuation Act, 1922, or under the Local Government Superannuation Act, 1937.

The successful candidate will be required to pass a medical examination.

Applicants must possess sound experience in commercial administration of an electricity undertaking, be full members of the Institute of Electrical Engineers and corporate members (at least) of the Institute of Mechanical Engineers and must be thoroughly familiar with all matters appertaining to the generation and distribution of electricity.

The appointment may be determinable by three months' notice by either party.

Particulars of the duties and conditions of the appointment may be obtained from the undersigned.

Applications, stating age, qualifications, experience, and accompanied by copies of three recent testimonials must be delivered to the undersigned not later than Saturday, the 23rd day of July, 1938.

Canvassing either directly or indirectly will disqualify.

H. L. LANG-COATH,
Town Clerk.

The Guildhall,
Swansea. 1147

METER REPAIRERS.

METER Repairers wanted by large Undertaking in the London and District Area.

Previous experience in the overhaul and repair of all types of alternating current and continuous current mercury motor meters essential.

Applications, stating age, qualifications and experience, with not more than three recent testimonials, to be addressed to Box 1393, c/o The Electrical Review.

SITUATIONS VACANT.—*Continued.*

BOROUGH OF HESTON AND ISLEWORTH.

Electricity Department.

APPLICATIONS are invited for the following positions:—

(1) 2 METER TESTERS AND REPAIRERS.
(2) 1 ASSISTANT METER TESTER AND REPAIRER.

Applicants must be conversant with the carrying out of actual repairs and calibration of both D.C. and A.C. single phase and polyphase Meters, and Prepayment and Maximum Demand Equipment.

(3) 1 METER FIXER.

Applicants must have had similar experience with a Municipal or Company Undertaking and be qualified to deal with the fixing and connection of both A.C. and D.C. Meters and equipment.

Wages and Conditions of employment will be in accordance with the District Joint Industrial Council (No. 10 area) Schedule, and the present rates of wages are as follows:—

Meter Testers and Repairers ...	£4 7s. 4d. per week
Assistant Meter Tester and Repairer	£3 9s. 9d. per week
Meter Fixer	£3 19s. 8d. per week

The successful candidates will be required to pass a Medical Examination and to contribute to the Council's Superannuation Fund.

Applications, stating age, qualifications, previous experience and present wages, together with copies of two recent testimonials, must reach the undersigned, enclosed in an envelope endorsed "Application for .....," by noon on Tuesday, 5th July, 1938.

HAROLD SWANN,
Town Clerk.

Council House,
Hounslow. 1451

BOROUGH OF STAFFORD.

Electricity Department.

APPLICATIONS are invited for the post of General Male Clerk in accordance with the Council's Grading Scheme (Grade IV) at a commencing salary of £170, rising to £210 p.a. by annual increments of £10.

Preference will be given to candidates having had previous experience with an Electricity Undertaking.

The above appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Act, 1922, and the selected candidate will be required to pass a medical examination.

Applications, in candidate's own handwriting, stating age, qualifications and experience and accompanied by copies of not more than three recent testimonials, must be submitted to the Electrical Engineer and Manager, Foregate Street, Stafford, not later than Saturday, 1st July, 1938.

Canvassing, either directly or indirectly, will be a disqualification.

T. BROUGHTON NOWELL,
Town Clerk.

Borough Hall,
Stafford. 1453

AIR MINISTRY.

Directorate of Works.

APPLICATIONS are invited for temporary appointments as Mechanical and Electrical Engineering Assistants in the Drawing Office at the Air Ministry and in the Drawing Offices at R.A.F. aerodromes in the provinces at a salary up to £420 per annum according to qualifications and experience.

Only applicants with first-class training and experience, aged 30 to 45 years, will be considered.

Candidates must be capable of design work and preparing finished drawings of complete electrical power and lighting schemes for aerodromes, internal equipment of domestic buildings, workshops, aeroplanes sheds. Preference will be given to candidates with mechanical engineering experience of power plants, water supply and sewage disposal works.

Requests for forms of application should be addressed to the Under-Secretary of State, Air Ministry (W.9), Adastral House, Kingsway, London, W.C.2, enclosing an addressed unstamped envelope. 35

TEST ROOM ASSISTANTS.

THE Meter Department of a large Power Supply Company in the London and District Area have vacancies for Test Room Assistants. Previous experience in the testing and calibration of all types of alternating and continuous current meters and standard instruments essential.

Salary £20 per month.

Applications, stating age, qualifications and experience, with not more than three testimonials, to be addressed to Box 1392, c/o The Electrical Review.

SITUATIONS VACANT.—*Continued.*

METROPOLITAN BOROUGH OF ISLINGTON.

Electricity Showroom Sales Staff.

APPLICATIONS are invited for the appointment of JUNIOR SALES AND SHOWROOM ASSISTANT (Male) at a salary of £150 per annum, rising by two annual increments of £10 to £170 per annum.

Candidates, who must be between the ages of 23 and 30 years, must have held a similar position in the Sales Department of an Electricity Undertaking and have a good knowledge of all types of electrical apparatus, with experience in their sale, hire and hire purchase. Candidates should also have a knowledge of Electricity Showroom records and bookkeeping.

Applications will be considered only from candidates of good education and address having the above-mentioned qualifications.

Forms of application and full particulars of the appointment will be supplied by the Borough Electrical Engineer, 341/3, Holloway Road, N.7, on or after the 27th June on receipt of a stamped addressed foolscap envelope.

Applications, which must be accompanied by copies of three recent testimonials, must be delivered to the Borough Electrical Engineer not later than noon on Monday, 11th July, 1938.

W. ERIC ADAMS,
Town Clerk.

Town Hall,
Upper Street, N.1.
18th June, 1938. 1482

BOROUGH OF REIGATE.

Electricity Undertaking.

CONSUMERS' ENGINEER.

APPLICATIONS are invited for the position of Consumers' Engineer in the Council's Electricity Department at a commencing salary of £300 per annum, rising, subject to satisfactory service, by annual increments of £20 to a maximum of £400 per annum.

Applicants must have had a sound technical training and previous experience as a Consumers' Engineer, also experience with hiring schemes and showrooms, maintenance of hired apparatus, installation work, layout of lighting and power installations, preparation of specifications, together with administrative and sales experience.

The appointment is a designated post under the Local Government and Other Officers Superannuation Act, 1922, and the candidate selected will be required to pass a satisfactory medical examination.

Applications, on forms to be obtained from the Electrical Engineer and Manager, 8, Linkfield Corner, Redhill (by forwarding a stamped addressed envelope) and accompanied by copies of not more than three recent testimonials, are to be sent addressed to the undersigned, endorsed "Consumers' Engineer," not later than the first post on Monday, the 11th July, 1938.

HEBER DAVIES,
Town Clerk.

Town Hall,
Reigate.
18th June, 1938. 1503

WAR DEPARTMENT.

JUNIOR LECTURER required on the electrical side of the Mechanical and Electrical Engineering Branch of the Military College of Science, Woolwich.

Candidates should preferably be under 35 years of age and possess a University Honours degree. A knowledge of the principles and practice of Radio Communications is desirable.

Annual salary scale: £300 by £18 to £400. The minimum of £300 will be reduced by £18 for every year by which the Junior Lecturer on appointment falls short of the age of 25.

The Federated Superannuation System for Universities will apply.

After 5 years' service as Junior Lecturer the successful candidate may expect, if he serves so long, advancement to the Lecturer grade on an annual salary scale of £400 by £18 to £454 by £25 to £600, if certified competent to perform the highest duties of the higher grade.

Increments are granted annually, subject to approved service.

Successful candidate will be required to take up his duties as early as possible.

Ex-Service candidates given preference other things being equal.

Application form obtainable by post-card from the Commandant, Military College of Science, Red Barracks, Woolwich, S.E.18, to be lodged not later than 8th July, 1938.

1507

SITUATIONS VACANT.—*Continued.*

BOROUGH OF BARKING.

Electricity Supply Department.

APPLICATIONS are invited for the position of:—
Assistant Sub-station Attendant.

Applicants must have had experience in the operation of Rotary Convertor Plant and H.V. Switchgear.

The appointment will be in accordance with the Electricity Supply Industry, District Council No. 10, wages now £4 1s. 9d. per week.

The appointment will be subject after six months' probationary service to the provisions of the Local Government and Other Officers Superannuation Act, 1922, and the selected applicant will be required to pass a medical examination.

Applications, giving particulars of age, education, training and details of experience on the above equipment, together with copies of three recent testimonials and endorsed "Sub-station Attendant," to be forwarded to the undersigned by 9 a.m. on Monday, the 4th July, 1938.

Canvassing in any manner will be deemed a disqualification.

S. A. JEWERS,
Town Clerk.

Town Hall,
Barking, Essex.
16th June, 1938. 1445

COUNTY BOROUGH OF WARRINGTON.

Appointment of Borough Electrical Engineer.

APPLICATIONS are invited from qualified Electrical Engineers, with experience in the operation of Generating Stations, for the position of Borough Electrical Engineer.

The salary has been fixed at £1,000 per annum, and candidates must not exceed 45 years of age. The office is an established post under the Local Government and Other Officers Superannuation Act, and the successful candidate will be required to pass a medical examination.

Form of Application may be obtained from the Town Clerk, Town Hall, Warrington, on receipt of a stamped addressed envelope, and should be returned to the undersigned in an envelope which will be provided for the purpose, not later than noon on Friday, the 8th July, 1938.

Canvassing directly or indirectly will be a disqualification.

A. T. HALLAWAY,
Town Clerk.

Town Hall,
Warrington.
June, 1938. 1444

ALDERSHOT BOROUGH COUNCIL.

Electricity Department.

APPLICATIONS are invited for the position of Rotary Sub-station Attendant.

Applicants must have had extensive experience of the operation and running of La Cour Motor Generators, and the operating of 6.6 kV, three phase, and Direct Current, three wire switchboards. Experience in the operation of 33,000 volt switchgear would be advantageous.

The wages will be in accordance with the District Joint Industrial Council No. 11 area Schedule, at present 1s. 7.73d. per hour. Applications, stating age, and full particulars of training and experience, together with copies of not more than three recent testimonials, are to be forwarded to the undersigned endorsed "Rotary Sub-station Attendant," not later than 1st July, 1938.

L. W. GEORGE,
Borough Electrical Engineer.

87, Victoria Rd.,
Aldershot.
18th June, 1938. 1517

ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS.

County Borough of Reading.

POST OF INSTALLATION INSPECTOR.

THE Executive Council of the A.S.E.E. requests members of the Association, and other engineers, to REFRAIN FROM MAKING APPLICATIONS for the above appointment at the inadequate remuneration stated in the advertisement of the Town Council.

Applications already made should be withdrawn.

A. BRAMMER,
General Secretary, A.S.E.E.

Aldwych House,
London, W.C.2. 1449

SITUATIONS VACANT.—*Continued.*

CITY AND COUNTY OF KINGSTON-UPON-HULL.

Electricity Department.

APPLICATIONS are invited for the position of TEST ASSISTANT.

Applicants should be under 40 years of age and be conversant with the testing and repairs of all classes of metering equipment, indicating instruments, relays and time switches. Preference will be given to those having had supervisory control of staff and general laboratory testing experience.

The commencing salary will be in accordance with the N.J.B. Schedule, Grade 9, Class J, i.e., at present £320 14s.

The appointment is subject to the satisfactory passing of a medical examination. The successful applicant must reside within the City Boundary and after a three months' probationary period he may be required to contribute to the Local Government and Other Officers Superannuation Scheme.

Applications, together with copies only of not more than three testimonials, to be submitted to The General Manager, endorsed "Test Assistant," by Monday, July 11th, 1938.

J. N. WAITE, M.I.E.E., F.I.F.,
General Manager and Engineer.

Electricity Offices,
Ferensway,
Hull.
June, 1938. 1502

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS (GREAT BRITAIN AND IRELAND)

and

ELECTRICAL POWER ENGINEERS' ASSOCIATION.

NOTICE.

COUNTY BOROUGH OF WARRINGTON.

APPOINTMENT OF BOROUGH ELECTRICAL ENGINEER.

THE Standing Joint Committee of the above Associations hereby requests Members of either Association, or any other Engineers, whether engaged in the Electricity (Supply) Industry or not, TO REFRAIN FROM MAKING AN APPLICATION for the above appointment, which has been advertised at the inadequate salary of £1,000 per annum.

The Standing Joint Committee desires to point out that the minimum commencing salary for the position should be £1,300 per annum.

ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY (SUPPLY) INDUSTRY OR NOT, ARE THEREFORE URGENTLY REQUESTED NOT TO APPLY FOR THE POSITION ON THE TERMS STATED BY THE BOROUGH COUNCIL IN ITS ADVERTISEMENT, AND IF AN APPLICATION FOR THE POSITION HAS ALREADY BEEN MADE IT SHOULD BE WITHDRAWN.

W. ARTHUR JONES, A.M.I.E.E.,
Secretary,
Standing Joint Committee,
A.M.E.E.-E.P.E.A.
1513

A JUNIOR Assistant Engineer is required by a large Supply Undertaking in the North, for meter and general testing work. Candidates must have had a proper technical and scientific training and practical experience of testing, maintenance and repair of all types of consumers' meters, and have a knowledge of mains testing and fault location and experience in the use of standardising instruments. They should be well versed in alternating current theory and possess initiative. The salary is in accordance with the N.J.B. Schedule, Grade 10, Glass G, at present £219 18s. per annum, and may be subject to the provisions of the Local Government Superannuation Act.—Apply, giving age, particulars of experience, etc., to Box 1510, c/o The Electrical Review.

A REPRESENTATIVE required for London by firm of Electrical Heating Engineers. Salary and commission, influence and first class connection with Architects, Consultants, etc., desirable. Write, stating age, experience, etc.—Box 1519, c/o The Electrical Review.

A WELL-Established progressive firm requires a sound technical man for research and development work in connection with F.H.P. Motors. Must have practical experience in electrical and mechanical design. State age, experience and salary required. South London district.—Box 1373, c/o The Electrical Review.

SITUATIONS VACANT.—*Continued.*

A YOUNG man, aged about 24, required for Production Office in West London district. Technical knowledge and experience in Drawing Office, also Wiring Diagrams for Switchboards essential requirements.—Write age, experience and salary to Box 1485, c/o The Electrical Review.

APPLICATIONS are invited for the position of Assistant Electrical Repairs Engineer in a Power Station in the London Area. Applicants must have had a sound technical education, and practical experience in the construction, maintenance and operation of E.H.T. and L.T. Switchgear, Transformers, Turbo-alternators, etc., is essential. Preference will be given to applicants who have also had experience in dealing with contractors in the installation of the above equipment in Power Stations. Commencing salary about £350 per annum, according to experience.—Applications, in writing, giving full particulars of education, technical training and qualifications, and full details of practical experience and positions held, should be sent to Box 1495, c/o The Electrical Review.

APPLICATIONS invited by leading manufacturers for practical Lighting Engineer, commercial and industrial, London and South England. Capable of introducing new lines. State age, experience, salary required.—Box 7145, c/o The Electrical Review.

ASSISTANT Distribution Engineer required by large Rural Electric Supply Undertaking. Age 30-35. University training preferred. Salary £450-£500. Progressive post. Full particulars of education and experience required.—Apply Box 1523, c/o The Electrical Review.

CABLE Estimating Assistant, must have experience of estimating and construction of Power Cables and conversant with the lay-out of Manufacturing Specifications. Applicants to state experience, salary required and age.—Box 1522, c/o The Electrical Review.

CABLE manufacturer required Longitudinal Driver, experienced with V.I.R.'s and Flexibles. State experience and wages required.—Kniveton Cable Works, Queensway, Enfield. 1500

COST Accountant required for Electric Lamp Factory for 3 months. Cost Accountant to introduce Factory Costing System for each type of Lamp manufactured.—Reply, stating qualifications, Lamp Factory Costing experience, and salary expected.—Box 1465, c/o The Electrical Review.

DRAUGHTSMAN, experienced in design of all types of resistances, including liquid neutral earthing.—State age, salary and experience to Box 1330, c/o The Electrical Review.

DRAUGHTSMAN required contracting electrical engineers works, with experience in automatic switchgear, wiring diagrams; state experience, age and salary.—Box 1512, c/o The Electrical Review.

DRAUGHTSMEN.—The English Electric Company invite applications from experienced Diagram Draughtsmen familiar with all types of Switchgear.—Applicants, stating age, qualifications, experience and salary expected, should write in the first instance to Chief Draughtsman, Switchgear Dept., The English Electric Co., Ltd., Stafford. 1416

DRAUGHTSMEN.—The English Electric Company invite applications from men experienced in the design and lay-out of all types of Switchgear.—Applicants, stating age, qualifications, experience and salary expected, should write in the first instance to Chief Draughtsman, Switchgear Dept., The English Electric Co., Ltd., Stafford. 1415

ELECTRICAL Contractors in N.W. London have vacancy for energetic man, able to estimate, interview and supervise. State salary and experience.— G. E. M. Co., 20, High Street, Pinner. 1474

ELECTRICAL Design Engineer required by a well-known company manufacturing large and medium size Motors and Generators. Applicants should have sound technical training and practical designing experience of A.C. machines including Synchronous Motors and Generators. The position is important and progressive and offers excellent opportunities to the right man.—Full particulars, with qualifications, experience, age and salary required in confidence, to Box 1473, c/o The Electrical Review.

ENGINEER Designer wanted for H.T. Switchgear. Experience of Continental practice an advantage.—State age, salary and experience to Box 1314, c/o The Electrical Review.

ENGINEERING Insurance Company requires an Engineer-Surveyor who must be a practical Engineer with experience in the construction, erection and repairs of cranes, and should have a good theoretical knowledge and be able to make dimension sketches. Some knowledge of lifts an advantage. Duties include the examination and testing of all classes of cranes, lifts and other lifting appliances. Salary to commence £260 per annum. Applicants must state age (which should be 28-30 years) and send full details of experience, particulars of certificates of theoretical knowledge and copies of testimonials.—Box No. 7051, c/o The Electrical Review.

ENSIGN Lamps, Ltd., Preston, Lancs, have vacancy for man with experience of high speed Sealing Machines. Half expenses paid for interview. State age and salary required. 1499

FOREMAN required by large Non-Ring Rubber Cable Makers for Cab Tyre Shops.—Apply Box 1374, c/o The Electrical Review.

JUNIOR Draughtsman, accustomed to Electric and Belt driven Lifts. General engineering knowledge an advantage. State age, wage and experience.—Henry Lowe (Lifts), Ltd., Falcon Works, Royton, Oldham. 7138

SITUATIONS VACANT.—*Continued.*

JUNIOR Tester required for resistance and small switchgear work.—Mickelwright, Ltd., Alperton, Wembley. 1496

LAMPSHADES.—Representative with genuine Lampshade connection and car required by established firm of Lampshade makers for Lancashire, Cheshire and North.—Box 1459, c/o The Electrical Review.

MAINTENANCE Electrician, handyman, single; installation consists of oil engines and electrical equipment, also hot and cold water supplies, central heating and car repairs; must live in. State wages required exclusive of board.—Apply: The Engineer, New Lodge Clinic, Ltd., Windsor Forest, Berks. 7152

MECHANICAL Draughtsman, experienced in electric motor power plant layouts for contracting electrical engineers works, London; state experience, age and salary.—Box 1511, c/o The Electrical Review.

PROGRESS Planners and Schedule Clerks Wanted with experience in Machine Shop Production of small Parts.—Apply, stating experience, etc., to Automatic Telephone & Electric Co., Ltd. (Dept. 40), Strowger Works, Edge Lane, Liverpool, 7. 1471

REPRESENTATIVE for electric space heating equipment for South Wales and West Country. Good connection with Architects, Supply Authorities and all sections of trade. State experience and salary required.—Box 1514, c/o The Electrical Review.

REPRESENTATIVE wanted by C.M.A. cable company for sale of their wires and cables in Aberdeen and North of Scotland. Must have experience and good connection. Motor car and stock depot will be provided.—Apply, stating age, experience, etc., to Box 1498, c/o The Electrical Review.

REPRESENTATIVE wanted by C.M.A. cable company for sale of their wires and cables in Midlands and West Counties of England. Must have experience and good connection. Motor car and stock depot will be provided.—Apply, stating age, experience, etc., to Box 1497, c/o The Electrical Review.

REPRESENTATIVE wanted, with good connections amongst Supply Authorities, other customers, for Transformers 0.5 to 250 kVA. Ambitious to progress with small factory.—Box 1326, c/o The Electrical Review.

REPRESENTATIVES.—A well-known firm manufacturing ventilating and air-conditioning plant is prepared to appoint suitable persons for whole time occupation residing in Scotland (Glasgow for preference) and the North (Lancashire for preference). Remuneration will be by salary and liberal commission. Applicants should give fullest particulars of age, qualifications, experience, etc.—Box 7093, c/o The Electrical Review.

REPRESENTATIVES for North-Eastern, also Yorkshire Area, required by well-known manufacturers of static condensers for power factor correction. Must be qualified engineer, preferably with other agencies.—Box 1486, c/o The Electrical Review.

REPRESENTATIVES to cover Northern half of England, Scotland and Ireland, small power transformers and general electrical and radio winding business. Progressive commission basis on closed territories. Write, giving fullest particulars.—Box 1501, c/o The Electrical Review.

SALES Engineer or Salesman junior required for Scottish branch of important manufacturing firm to sell C.M.A. cables and engineering products. Connection not essential but preferred. State fullest details, age and salary required.—Box 1458, c/o The Electrical Review.

SALES Engineer, 25-35, required by London factory of important German L.T. Power Switchgear makers. Applicants must have thorough knowledge of Motor Starting Gear and must be prepared to accept training at London office and at works in Germany. Knowledge of German an advantage.—State salary required to Box 1439, c/o The Electrical Review.

TELEPHONE Engineer required for British West Indies with first class knowledge of maintenance adjustments of Strowger type automatic switching systems. Single man preferred. Salary £400 to £450 per annum, depending upon qualifications.—Apply, giving full particulars of age, training and experience, to Box 7154, c/o The Electrical Review.

TRANSFORMER Draughtsmen required, state experience.—Yorkshire Electric Transformer Co., Ltd., Empire Works, Thornhill, Dewsbury. 1464

TRANSFORMERS.—Firm in North London require Foreman with all-round experience of winding, general assembly, tanking, etc. Good disciplinarian with organising abilities essential. Progressive position for suitable man.—Write, stating age, experience and salary required, etc., to Box 1469, c/o The Electrical Review.

TRAVELLERS for London, the whole country and Eire; Factory making Carbon Brushes, etc., requires experienced men with live connection. Salary and liberal commission. Applicants, ambitious to progress with small works, should give fullest particulars of age, salary required, connection.—Box 1487, c/o The Electrical Review.

WANTED, Assistant Superintendent to supervise the manufacture of railway, tramway, and other types of traction motors. Must have had previous executive experience in all departments of works manufacture and production.—Box 1414, c/o The Electrical Review.

SITUATIONS VACANT.—*Continued.*

WANTED at once, Plumber-Jointer for near East, must be fully experienced in E.H.T. and L.T. jointing of cables and switchgear. Subject to strict medical examination. Teetotaller preferred.—Full particulars and copies of references to Box 7148, c/o The Electrical Review.

WANTED for the Midlands.—Assistant Colliery Electricians, with 3 phase experience. Must be good timekeepers and early risers, capable of maintaining all kinds of electrical plant. Standard wages paid.—Apply, with age, experience, etc., to Box 1456, c/o The Electrical Review.

WANTED for Midlands, energetic and experienced Installation Engineer. Must be capable of handling Electrical Contracts from enquiry to completion. Only those with sound experience in Estimating, Supervising and carrying out Electrical Contracts in Factories, Hospitals, Industrial and Public Buildings, etc., need apply. Controlling of men and organising ability essential.—Apply, in confidence, stating experience, age and salary required, to The Secretary, B. French, Ltd., Mill Street Electrical Works, Kidderminster. 1520

WELL-KNOWN maker of Electrical Appliances requires representatives for the British Isles. Wholesale and supply company connection essential.—Box 1493, c/o The Electrical Review.

YOUNG Man, 18 years, to help in Stores, West End Wholesaler. State knowledge of Accessories, Wage and Experience.—Box 1494, c/o The Electrical Review.

APPOINTMENTS FILLED.

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision. We will then insert a notice free of charge under this heading.

CARDIFF Corporation (Domestic Maintenance Engineer); Lothians Electric Power Co. (Engineer Overhead Line Construction).

SITUATIONS WANTED.

SALES MANAGER.

20 Years' experience electrical trade, specialist in refrigeration, domestic and commercial, domestic appliances, industrial specialities, etc. Well connected trade, wholesale, supply companies, stores, industry, etc., throughout British Isles. First class references. Authority on H.P. direct selling and appointment of agents, etc. Applications from principals of firms of repute only. Free immediately. Fluent French and German. British Public School man.—Box 1348, c/o The Electrical Review.

SALESWOMEN AND DEMONSTRATORS.

A NUMBER of SALESWOMEN and DEMONSTRATORS having completed specialised Electrical Training require posts. Apply to:—

London School of Electrical Domestic Science,
Bureau K, Imperial Court, 2, Basil Street, London, S.W.3. 1308

A FIRST Class Electrician, young, possesess initiative, West End and suburban competitive experience, technical knowledge; can drive car; charge or otherwise.—15, Sussex Way, Southgate. 'Phone: Barnet 2289. 7150

A PERMANENT executive post with firm of good standing, London or Home Counties, required by man of proved ability. Extensive managerial and secretarial experience various branches electrical industry. Qualified to deal with important duties demanding sound judgment and initiative, also control and efficiently train staff. Capable of undertaking complete management of small business. Prospects of greater importance than initial salary as confident energetic application of organising abilities will ensure mutual satisfaction with progressive success.—Box 7060, c/o The Electrical Review.

A STUDENT I.E.E. (24) desires change, public School education, 5 years' contracting experience.—Box 7115, c/o The Electrical Review.

A YOUNG Engineer (24), Stud. I.E.E., sound technical training, desires position, good references, practical experience with talking picture equipment.—Write Box 42, 75, Roundwood Way, Banstead, Surrey. 7086

A YOUNG man, 25, 9 years' experience light electrical and mechanical engineering, including 5 years' works apprenticeship, inspection, experimental, drawing office and other departments, seeks progressive situation.—Box 7092, c/o The Electrical Review.

ACTIVE, keen and intelligent young Electrical Engineer seeks progressive post, contracting experience, proved ability, sound technical knowledge; languages.—Michael M. Neidle, 49, Beaumont Square, E.1. 7114

ADVERTISER, with wide commercial and purchasing experience, supply industry, wholesalers and manufacturers, seeks position. Moderate salary.—Box 7063, c/o The Electrical Review.

ADVERTISING Manager desires position of scope. Thoroughly versed in all branches of technical publicity. 10 years' experience. Responsible for advertising in trade journals, preparation of publicity literature and exhibition work. Good organiser, used to controlling staff. Unimpeachable references.—Box 7076, c/o The Electrical Review.

SITUATIONS WANTED.—*Continued.*

A.M.I.E.E., A.M.I.Mech.E., will be disengaged shortly; administrative and executive experience, generation, transmission, distribution; industrial and commercial installations.—Box 7146, c/o The Electrical Review.

AN Electrician requires job in installations or maintenance.—Box 7109, c/o The Electrical Review.

AN Electrician seeks situation, knowledge all systems. Any distance. Disengaged. Ex. refs.—Box 7149, c/o The Electrical Review.

ANY capacity experienced Electrician, any distance. Power, Lighting, all branches. Highest references.—35, Caversham Road, London, N.W.5. 7151

ASSISTANT to Manager, Electrical Contractors; first-class knowledge shorthand, typing, costing, dictaphone, sales, estimating and general office routine; resident N.E. Midlands. Salary £3 per week.—Box 1427, c/o The Electrical Review.

COST Accountant.—Commercial Engineer, with 20 years' practical experience of cost and works accountancy to final figures. All piecework systems. Install or modify systems, or would act as Consultant.—Box 7094, c/o The Electrical Review.

ELECTRICAL Engineer (Austrian refugee), 24 years old, with diploma of the Technical High School of Vienna, desires situation. Fluent in English, German and French.—Box 7055, c/o The Electrical Review.

ELECTRICAL Engineer, age 28, National Certificate, six years' apprenticeship with electrical machinery manufacturers, four years estimating, design, repair, installation and change-over work, two years' power station and plant, seeks progressive post with good firm.—S. W. Stevens, 23, Mostyn Avenue, Wembley, Middx. 7049

ELECTRICAL Engineer, 30 years' practical experience, contracting, maintenance and retail, desires responsible position in Torquay or Paignton districts. Full particulars.—Box 7057, c/o The Electrical Review.

ELECTRICIAN, disengaged, used to new or maintenance.—Trott, 18, Blenheim Rd., E.17. 7061

ELECTRICIAN, experienced in all systems, contracting or factory maintenance.—Pooley, 47, Glenwood Drive, Gidea Park, Essex. 7111

ELECTRICIAN, experienced in power lighting and factory maintenance.—"E. C.," 23, Hillfield Avenue, N.8. 7054

ELECTRICIAN, first class power, lighting, alarms, neon installation or repairs, car owner, anywhere.—Robertson, 73, Station Rd., Chingford. 7065

ELECTRICIAN, general all-round, screwed barrel, motors, 'phones, etc.—Box 7069, c/o The Electrical Review.

ELECTRICIAN, good all round; excellent references; anywhere.—43, Sussex Street, S.W.1 7110

ELECTRICIAN, Mate, requires situation; four years' experience of lighting, heating, power and bell work.—R. Whiddett, 32, Wolves Lane, N.13. 7140

ELECTRICIAN, 21 years' experience. Lighting, A.C. and D.C. power. Fault finding and repair, technical training. Able to take charge.—L. Glaser, 1061a, Finchley Rd., N.W.11. 7113

ELECTRICIAN (28), experienced in all systems, requires job; good references.—Box 7142, c/o The Electrical Review.

ELECTRO-Acoustics.—Keen young man (21) with ability, desires opening, any branch, technical student, installation and general experience.—Box 7056, c/o The Electrical Review.

ENGINEER, young, wide experience, sales, maintenance, repairs, lighting, heating, power, requires progressive position.—Box 7141, c/o The Electrical Review.

ENGINEER, 23, silver medallist in Turbine Construction. Practical Installation and Running Experience. Seeks position in Works Power House or simlar.—Box 7081, c/o The Electrical Review.

ENGINEERS' Purchasing Clerk (29), radio, electrical, fully conversant Government contracts, capable control; certificated bookkeeper, efficient shorthand-typist; excellent references.—Write L. C. Lee (Miss), 27, Hubert Road, Wimbledon, S.W.19. 7107

ESTIMATING Foreman, age 38, 24 years' experience London contractors, desires responsible position.—A. B., 16, Cranleigh Gardens, Loughton, Essex. 7127

FIRST-Class Foreman Electrician, with long experience of large installations with London contractors, including estimating and layout experience, desires progressive position.—"W. B.," 139, Oaks Avenue, Worcester Park. 7088

INSTALLATION Engineer, young, desires position where technical and practical ability will be recognised. Used to total electrical equipment of factories, offices, etc., and to the control of labour.—Box 7117, c/o The Electrical Review.

JOINTER, first-class experience all cables, to 33 kV, static subs., link boxes, feeder pillars, services, etc., seeks situation.—Box 7072, c/o The Electrical Review.

PLUMBER-Jointer, experienced 11 kV sub-station jointing, etc., seeks change.—Box 7052, c/o The Electrical Review.

SITUATIONS WANTED.—*Continued.*

REFRIGERATION. Qualified Installation and Service Engineer with own car desires change, 2½ years present situation. Experienced, Frigidaire, Kelvinator, Lightfoot, and Coldrator, domestic and commercial equipments.—Engineer, 128, Hythe Avenue, Bexley Heath, Kent. 7147

REPRESENTATIVE desires additional lines, valuable connection, Southern Counties.—Box 7013, c/o The Electrical Review.

REPRESENTATIVE, disengaged, live connection in London and suburbs.—Box 7124, c/o The Electrical Review.

REPRESENTATIVE with live connection among London and suburban wholesalers, accessories, cable, etc.—Reply Box 7132, c/o The Electrical Review.

TECHNICAL Assistant (38), wide knowledge of physical and electrical apparatus, technical institute training, seeks laboratory post, testing or development.—E. G. C., 13, Powis Gardens, Bayswater, W.11. 7131

WIREMAN, all branches, wants work.—Haines, 26, Little Goodge Street, W.1. 7058

WIREMAN, competent, long experience, all branches.—D., 33, Dickens Avenue, Finchley, N.3. 7144

YOUNG qualified Engineer, seven years mains and industrial domestic and agricultural load development, seeks change with progressive concern. Technical or commercial. District immaterial.—Box 7112, c/o The Electrical Review.

FOR SALE.

Advertisements under this display section are inserted at 14s. per inch (minimum one inch).

CITY OF STOKE-ON-TRENT.

Electrical Engineer's Department.

SALE OF CONVERTING PLANT AND D.C. SWITCHBOARD AT STOKE SUB-WORKS.

CONTRACT No. 3829.

TENDERS are invited for the purchase and removal of Surplus Plant at the Stoke-upon-Trent Electricity Sub-Works, Bagnall Street, Stoke-on-Trent. This plant has been in use up to change-over. It comprises two 500 kW and one 1,000 kW Bruce Peebles La Cour Motor Converters and one 600 kW Metro-Vickers Rotary Converter, all rated for 6,600 volts, 3 phase, 50 cycles to 500 volts D.C. Also a 20 panel D.C. L.T. Feeder Switchboard.

Tender Forms, Specifications and Conditions of Contract may be obtained and the plant viewed on written application to the City Electrical Engineer, 31, Kingsway, Stoke-on-Trent.

Contractors are required to conform to the Standing Orders of the City Council relating to Contracts.

Tenders in plain sealed envelopes, which shall not bear any name or mark indicating the sender, to be delivered to the undersigned by the first post on Wednesday, 13th July, 1938.

E. B. SHARPLEY,
Town Clerk.

Town Hall,
Stoke-on-Trent. 1506

ELECTRIC MOTORS AND DYNAMOS.

WE hold one of the largest Stocks of New and Second-hand Motors. Second-hand machines are thoroughly overhauled. Inspection and Tests can be made at our Works.

For Sale or Hire. Send your inquiries to:—

BRITANNIA MANUFACTURING CO., LTD.,
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CITY ROAD, LONDON, N.1.

Telephone: 5512-3 Clerkenwell. 13

FOR SALE.

2,000 D.C. ampere hour Meters of various sizes from 2½ amp. to 50 amp.

250 230-volt D.C. Current Limiters.

May be inspected by appointment.

Apply R. Illingworth, Esq., M.I.E.E., M.I.Mech.E., Borough Electrical Engineer & General Manager, Poplar Electricity Works, Glaucus Street, Bromley-by-Bow, E.3. 1448

A.C. and D.C. Motors. New and Second-hand. Sale or Hire. Largest Stock in Central London. Competitive trade prices.

E. P. ALLAM & CO., LTD. (Electroplant Dept.),
6A, GT. JAMES STREET, W.C.1. 342

FOR SALE.—*Continued.*

WELDING EQUIPMENTS.

TWO METALLIC ELECTRODE ARC WELDING EQUIPMENTS BY METRO VICK, designed for 400 volts, 3-phase, 50 cycles input, 1,440 r.p.m.; output 200 amps., 80/25 volts; ball bearings. Manufactured 1934.

THREE WELDING SETS BY FULLER, Type K.X.q., Compound Wound Interpole Generators, 15/50 volts, 15/120 amps. Direct coupled to 8 H.P., 400 volts, 3-phase, 50 cycles Squirrel Cage Motor and Exciter, forming one combined unit, brushgear adjustment and ammeter.

GEORGE COHEN, SONS & CO., LTD.,
STANNINGLEY, LEEDS. 1489

GEORGE COHEN, SONS & COMPANY, LTD., FOR RECONDITIONED AND GUARANTEED A.C. AND D.C. ELECTRICAL MOTORS AND EQUIPMENT.

Write our nearest depot:
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'Phone: Shepherd's Bush 2070.
and
Stanningley Works, near Leeds.
'Phone: Stanningley 71171. 1492

FOR SALE.

150-H.P. Howden High Speed Compound 8 in. x 15 in. x 7 in. 195 lb. W.P., 500 r.p.m., direct coupled to English Electric Co. Alternator, 55 kW, 480 V, 3 ph., 50 cycles, direct coupled exciter. 45-kW Siemens D.C. Compound Wound Generator, 250 V, 580 r.p.m., belt driven from 25-in. pulley mounted on crankshaft between flywheel and alternator.

All the above plant in good condition, and any reasonable offer considered for the complete set or any separate unit.

GUARD BRIDGE PAPER CO., LTD.,
Guard Bridge, Fife. 1475

550 H.P., 500 volt, 3-phase, 50 cycles Slip-ring Induction Motor, by English Electric Co., Ltd., 580 r.p.m., complete with bedplate, two pedestal ring oil bearings, brush raising short circuiting gear. Suitable Ellison Switchgear available.

Further details and price from

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STANNINGLEY, LEEDS. 1490

TWO 170 H.P. AUTO SYNCHRONOUS MOTORS, by CROMPTON; 188 r.p.m., 415 volts, 3-phase, 50 cycles, mounted on bedplate with two pedestal bearings, direct coupled exciter. Complete with Ellison Starting Equipment.

GEORGE COHEN, SONS & CO., LTD.,
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FOR SALE.

TWO 274-kVA Booster Equipments, Fuller and Metro-Vick. Seen Manchester. Two Booster Transformers, give 10 per cent. ± boost on 3,000 kVA, 6,600 volt feeder, modern tap changing on load, in same tank, with all accessories; correspondence.—Kerr, 24, Viewmount Drive, Glasgow, N.W. 7139

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A.—LARGEST stock Instrument and Resistance Wires, Searchlights, Mirrors (sale or hire), surplus Carbon Rods, Insulating materials.—London Electric Firm, Croydon. 1239

A.C. and D.C. Motors, reconditioned, large stocks, Polishing Motors, 3 phase, ½ and 1 h.p., cheap.—Milo Eng. Works, Milo Road, East Dulwich, S.E.22. (FOR. 4422). 7133

A.C. Motors, new, Met.-Vick, ¼-½ h.p., 230/1/50, of various descriptions, big quantities. Special offer from J. Gerber & Co., Ltd., 23a, White Street, London, E.C.2. 1476

AERIAL Cables, all sizes quoted for low prices.—Edwardes Bros., 20, Blackfriars Road, London. 7155

AHALL Blue Printer, 54 x 32 in. Half price.—The London Electric Firm, Croydon. 1380

ALTERNATING Diesel Sets, 375, 250, 170, 100, 50 kVA 400/3/50, with guarantee.—Kessel, Ltd., Wembley, Mddx. 1478

FOR SALE.—*Continued.*

AMMETERS, Voltmeters, House Service Meters (quarterly and prepayment), a.c. and d.c., all guaranteed one year; low prices.—The Victa Electrical Co., 47, Battersea High Street, S.W.11. 'Phone: Batt. 0780. 5469

BEST English Cables, 1/.044 and all standard sizes up to and inc. 127/.103, new guaranteed quality, low prices. Price lists.—Edwardes Bros., 20, Blackfriars Road, London. 7156

BRAND new ¼ h.p. one phase Motors, totally enclosed, ball bearing, 50s.—John E. R. Steel, Bingley. 331

BAKELITE Mouldings to Specification.—Collier Electric Co., Ltd., Edwin Road, Twickenham. 810

DIESEL Generating Sets, 20 and 10 kW.—Box 1526, c/o The Electrical Review.

D.P. Battery, 600 ampere hour, 54 cells, 3 years old.—Marshall, 132, W. Nile Street, Glasgow. 1435

E.B.L. Braided Cables, E.B.L. Tough Rubber Cables, E.B.L. Lead Covered Cables are reliable, low priced, and fully guaranteed. Price list.—Edwardes Bros., 20, Blackfriars Road, London. 7157

ELECTRIC Signs at lowest prices. Write for designs.—King's Signs, Ltd., Sunbeam Road, N.W.10. 7135

ELECTRICAL Accessories for house, factory and outdoor use, everything from the mains to the lampholder, including lamps at lowest prices, all goods guaranteed.—Edwardes Bros., 20, Blackfriars Road, London. 7158

FOR Sale, 16-volt Lighting Plant, consisting of 1½-h.p. Petter oil engine, "New" 250-W Dynamo, 9 Chloride cells, 120 Ah Battery, stand, rough switchboard with V and ammeters, shunt regulator, auto cut-out switches, etc.; 35-gal. Oil Cabinet with pump. The lot £20 on site, Essex.—Box 1466, c/o The Electrical Review.

HYDRAULIC Pumps.—Pump Unit, Ltd., 25, Coptic Street, London, W.C.1. 1426

INSTRUMENTS for all purposes. Amps, Milliamps, Microamps, Volts, Millivolts, Ohms and Megohms all accurately measured by the 50-range "Dix-Onemeter." A compact moving coil, Precision Fault Locator, 55/-. Type "S" Valve Analyser. Panel has M.C. meter with rectifier for A.C. All ranges. Adaptor on cable and prods. Fully guaranteed. £5. A.C. Rectifier and charges for change-overs. Switchgear and autos made to customers' specification.—Leslie Dixon Switchgear Co., 218, Upper Thames Street, E.C.4. 29

LEAD Covered and Armoured Cables, P.I. and V.I.R. various, special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London. 7159

MOTOR, 3½ H.P., 205 volts A.C. with starter, £3.—68, Brookwood Road, Southfields, S.W.18. 7134

NAMEPLATES, Engraving, Diesinking Stencils, Steel punches.—Stilwell & Sons, 153, Far Gosford St., Coventry. 14

ONE 75-kW Crompton D.C. Generator, four wire system, suitable for 235-250 volts or 450-500 volts, complete with static balancer and switchboard.—Box 1366, c/o The Electrical Review.

PORCELAIN Insulators to suit small, medium or large cables, also spindles and brackets, cheap.—Edwardes Bros., 20, Blackfriars Road, London. 7160

PELAPONE Sets, 100/140 V, 2, 3½, 10 kW; 2-kW ditto, with Battery; Kohlers, 800 W; 1,500-W ditto, 220 V, 1½ kW; 5 kW; selection Power House Plant (list).—Binns, 156a, Falsgrave Road, Scarborough. 7130

RUBBER Cables, heavy, single and twin, also Trailing Cables.—Edwardes Bros., 20, Blackfriars Rd., London. 7161

SALE or Hire; Beeantee, Striplighting, Floodlights, Animated Electrical Novelties for Fêtes and all National festivities. Particulars upon application.—Beeantee Illuminations, Ltd., 88, Goswell Road, London, E.C.1. ('Phones: Clerkenwell 0411/2). ('Grams: Maceletty, Barb, London.) 23

STAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition.—Write Box 9, c/o The Electrical Review.

STAGE and Ballroom Lighting Apparatus; Spotlights, Floodlights, Dimmers, Mirror Bowls, Footlights, Battens, Arcs, etc., etc., actual manufacturers; large illustrated catalogue on request.—D. Walter & Co., 61-63, Lant Street, London, S.E.1. 'Phone: Hop 3651. 8

STRIPLITE Lampholders, 7/.029 twin rubber cable and coloured lamps cheap.—Edwardes Bros., 20, Blackfriars Road, London. 7162

TWO compound high-speed steam engines in first-class condition, complete with surface condenser and air pump, 200 b.h.p. at 500 r.p.m. Can be supplied with or without reduction gear, 500/185 r.p.m.—Box 4516, c/o The Electrical Review.

¼ h.p. "Delco" D.C. Motor and Rails, 50v. 850 r.p.m. Good running order. £3, on rail.—Wilkin, Tiptree Hall, Essex. 1518

2 10-H.P., 400-V, 1-phase Higgs Motors, slip ring, 1,000 r.p.m. Ellison NV.OL Starters, nearly new. Also 10-h.p. 400-V Century, 1,440 r.p.m.—E. R. P., 15, Clerkenwell Green, London, E.C.1. 7143

7-H.P. Slip Ring Motor, 3 ph., 440 V, complete with slide rails and starter. Brand new. Price against enquiry: No. 10 Shed, 16, South Wharf, W.2. 1460

FOR SALE.—*Continued.*

12 LANTERN Bracket E.L. Fittings for sale. Offers.—L. S., 20, Kensington Court, London, W.8. 1470

12 PANELS draw-out type switchboard cubicles, 11,000 volts, 300-amp. size breakers.—Box 1472, c/o The Electrical Review.

35 KW Motor Generator, Exciter and Switchgear, suitable for Ward-Leonard control. Motor 400 volts, 3 phase, 50 cycles. Generator 0-230 volts d.c. Little used. £95.—Box 1483, c/o The Electrical Review.

14½ KW D.C. Generating Set, 220 volts, driven by 22½ h.p. Blackstone High-speed Crude Oil Engine, only 18 months old.—Fred Watkins, Coleford, Glos. 1353

120-H.P. Auto-Synchronous Motor, 400 volts, 3-phase, 50 cycles, 210 r.p.m., with exciter, Unity P.F.—Box 27, c/o The Electrical Review.

120 KW Allen 220 volt D.C. Steam Generating Set; 30 KW Belliss Ditto 220 volts D.C.; 200 KW Belliss Ditto, 460 volts D.C.; Weir Boiler Feed Pump, 10,000 g.p.h.—Harry H. Gardam & Co., Ltd., Staines. 'Phone: 98. 1425

150-KVA, 440-v, 3-ph., 50 per., 500 revs. Alternator, Phœnix, 3-bearing, direct coupled exciter.—Greenhalgh Bros., Burtons Field Mill, Atherton. 'Phone: 117. 1276

200 and 250 h.p., S.R. 400/3/50 Motors, 485 r.p.m., 26 kW, 220 volts "Allen" Steam Set.—Box 4750, c/o The Electrical Review.

220 H.P., 440 V, 3 ph., 50 per., 420 revs. S. R. Mather & Platt (3 brgs.) starting gear.—Greenhalgh Bros., Burton's Field Mill, Atherton. 1332

500 ELECTRIC Motors, Dynamos, Transformers, Converters, etc., etc., at low prices.—S. C. Bilsby, A.M.I.C.E., A.M.I.E.E., Crosswell Road, Langley, near Birmingham. 'Phone: Broadwell 1359. 21

750-KVA Alternator, G.E.C., 440/3/50, 750 r.p.m., 3 bearings, as new.—Box 1477, c/o The Electrical Review.

1935 60/80 H.P. "Brush" Cold Starting Crude Oil Engine, totally enclosed, twin horizontally opposed cylinder, complete with all accessories.—Box 1099, c/o The Electrical Review.

3,000 YARDS 7/.064 new twin core P.I.L.C. D.S.T.A. and S. cable, 1s. 6d. per yard, 25 cwt. of Copper Bus Bars, sizes from 4 in. x ¼ in. to 1 in. x ¼ in., various lengths.—R. F. Winder, Ltd., Cross Belgrave Street, Leeds, 2. 1462

28/.012 Twelve Core Rubber Flexible Cable, 2,000 yds., cheap.—Edwardes Bros., 20, Blackfriars Rd., London. 7163

ARTICLES WANTED.

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ALTERNATOR, about 125 kVA, 400 volts, 3 phase, 50 cycles, 500 r.p.m., suitable for rope drive, and complete with switchgear.—Full particulars and lowest price.—J. S. Ramsbottom, Bow Street, Keighley. 1461

ASK us to Buy your Scrap Electric Cable, Old Plant, and non-ferrous Metals. Highest prices paid.—Jewell & Son, Metal Merchants, Oldbury, near Birmingham. 15

STEAM Engine. Vertical Compound to give 40 h.p. and 54 Good Cells, about 250 A.H.—Box 1525, c/o The Electrical Review.

WANTED immediately for shipment, good second-hand Crude Oil Engines, Dynamos, Motors. Prompt cash on inspection.—Fred Watkins, Coleford, Glos. 4743

WANTED, Surplus Fittings, Cable, Conduit and Bakelite Accessories.—Kaye, 67, Culverley Road, S.E.6. 7128

WANTED urgently, 20,000 Bakelite S.C.C.G. Lampholders. Spot cash waiting.—Lowest price and sample to Box 7129, c/o The Electrical Review.

2,000 KVA or nearest, Turbo Generator Set, any voltage, 3 phase, 50 periods, 160 lb. steam pressure, with Condensing Equipment. For standby purposes.—Box 7137, c/o The Electrical Review.

AGENCIES.

Advertisements are inserted in this section at 1s. 9d. per line per insertion.

COUNTY Distributors required. To sell "Speed Queen" Products (Washing Machines, etc.).—Write to sole British distributors, VACS Domestic Appliances, Butterworth Street, Littleborough, Lancs. 'Phone 8338. 7136

LIVE Representatives already calling on wholesalers and electrical supply authorities to sell latest domestic electrical appliances and novelties on commission basis. Closed areas.—Box 1467, c/o The Electrical Review.

LONDON Manufacturing Chemists selling nationally advertised product of universal utility with particular appeal to hotels and other commercial users, wish to entrust their regional agency to reputable firms having the necessary connections and outdoor sales staff. Territories open Midlands, Home Counties and South Coast.—Write in confidence to Box 4719, T. B. Browne's Advt. Offices, 163, Queen Victoria Street, E.C.4. 1468

AGENCIES.—*Continued.*

"QUICKFIX" Reflectors: The proprietors of this well-known make of Shop Window Reflector are desirous of appointing as representatives in Manchester, Birmingham, Newcastle and Belfast districts a firm of wholesale electrical factors.—Apply: Hilson, Hall & Co., 201, St. Vincent Street, Glasgow, C.2. 1457

TRAVELLERS for London, the whole country and Eire; factory making carbon brushes, etc., requires experienced men with live connection. Salary and liberal commission. Applicants, ambitious to progress with small works, should give fullest particulars of age, salary required, connection.—Box 1488, c/o The Electrical Review.

WELL-KNOWN manufacturers of electric heating equipment require Agents for sale of their products in Lancashire area, essential to have a good connection with wholesalers, contractors, supply companies, and shipping firms.—Apply in first instance, stating experience, etc., Box 1508, c/o The Electrical Review.

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STATUTORY ELECTRICITY UNDERTAKING.

OFFERS considered for controlling, or possible 100 per cent. interest in small company, rapidly growing resort, Cambrian coast.

Box 1524, c/o The Electrical Review.

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Advertisements are inserted in this section at 1s. 9d. per line per insertion.

CAPITAL.—Bank Official (retired), having procured substantial sums for numerous Private Companies, has Clients with £2,000 to £5,000 each requiring Directorships.—Write Box 455, Sells, Ltd., 14, Lancaster Place, W.C.2. 1484

GRADUATE research engineer with Continental experience, is willing to enter into partnership, small capital, thorough theoretical and practical knowledge. Specialities among others, vacuum technic, lamps, filament and discharge, high frequency. Own ideas, own patents.—Box 7153, c/o The Electrical Review.

MISCELLANEOUS.

Advertisements are inserted in this section at 1s. 9d. per line per insertion.

NOTICE is hereby given that the Transfer Books and Register of Members of Aron Electricity Meter, Limited, will be closed from the 29th June to the 9th July, 1938, both dates inclusive.—By Order of the Board, H. G. Burrows, F.C.I.S., Secretary. 1480

EDUCATIONAL NOTICES.

Advertisements under this display section are inserted at 14s. per inch (minimum one inch).

I.C.S. **The largest and most successful Institution in the world devoted to spare-time training by post offers thoroughly sound Courses of Instruction to cover the following examinations:**

Graduateship, I.E.E.

City and Guilds Electrical Engineering Practice, Electric Installation, and Telecommunications.

G.P.O. Probationary Assistant Engineer (Limited).

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Institute of Wireless Technology.

Other Courses meet the requirements of all who desire to qualify for responsible positions in Electric Power, Light and Traction Stations. Equally successful is our instruction for Telegraph and Telephone Engineers, Telegraphists and Telephonists, Radio Engineers, Radio Servicemen, and those who wish to study Television.

Instruction is by correspondence from textbooks specially prepared by many experts in tuition by post.

WRITE FOR SPECIAL BOOKLET

and state the particular Examination or Subject in which you are interested

INTERNATIONAL CORRESPONDENCE SCHOOLS, LTD.
Dept. 55, International Buildings, Kingsway, London, W.C.2

EDUCATIONAL NOTICES.—*Continued.*

GRAD. I.E.E. RESULTS.

IN recent Grad. I.E.E. Examinations 174 candidates sat who had taken B.I.E.T. Courses. Of these 165 were successful in passing the Examinations. We believe this record of 165 successes out of 174 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of coaching which we have laid down.

The B.I.E.T. tutorial organisation is waiting to assist you—either with a short specialised course or complete training for a recognised Examination.

Our permanent full-time staff totals almost 200 persons—the efficiency of our huge organisation is a byword among engineers.

WE GUARANTEE—"NO PASS—NO FEE"!

May we send a copy of "ENGINEERING OPPORTUNITIES" containing 268 pages of most useful advice and detailed information on over 200 Home-Study Courses and Examinations. A post card will bring the Handbook by return—FREE, post free and without obligation.

(*N.B.—We do not contribute to the view that personal representatives are necessary to a correspondence college, so that you will not be troubled by personal callers.*)

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY,

12, Shakespeare House, 17, 18 & 19, Stratford Place, Oxford Street, London, W.1. 7008

Replies to advertisements under Box numbers should be addressed as follows :—

To Box ——
ELECTRICAL REVIEW,
DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1

E.R.5

75 YEARS

For seventy-five years "The Colliery Guardian" has served the Mining Industry.

"The Colliery Guardian" is published every Friday and gives the latest information on current topics, and deals with every aspect of mining. Each issue contains useful technical articles, and current prices from the various centres.

The Annual Subscription, post free, payable in advance, is as follows: United Kingdom, 31s. 6d.; Canada, 32s. 6d.; Foreign and Colonial, 35s.

Further particulars and a specimen copy on application.

The
Colliery Guardian

30 & 31 FURNIVAL STREET, HOLBORN, LONDON, E.C.4
Telephone: Holborn 7141 (2 lines)

E.R.23

COMPANY MEETING.

THE BRITISH ELECTRIC TRACTION COMPANY, LTD.

Another Good Year.

THE FORTY-SECOND ORDINARY GENERAL MEETING of the above Company was held on Friday, 17th June, at Winchester House, Old Broad Street, London, E.C.

MR. J. S. AUSTEN (the chairman) said that once again he started his speech by telling the shareholders that they had had a very good year and that their profits had increased by about £56,000 over those of the previous year, which itself had shown an increase of £59,000 over the year before, so that in those two years together they had had an increase of about £115,000.

He was in the happy position of not having to say anything about a valuation, because they did not make valuations. He always distinguished between value and valuation, and, when it came to value, they had only to remember that they had that £56,000 increase in their profits, and it would be quite fair to say that the company was worth, treated as a going concern, £1,000,000 more than it had been last year, whatever the value might have been then. Therefore, he said, "Why bother about a valuation?"

UNDIVIDED PROFITS

They were adding the large sum of £185,000 to their undivided profits account, and in that connection he might say that every year they received one or two letters from stockholders asking them to "ladle out" something from that fund. Those letters came from stockholders who desired a larger income, but he had told the stockholders many times that their stock must not be looked to for income, but for increase of capital value. In fact, it was a sort of automatic savings bank, and, when he told them that an original holder of £100 of stock, if he had kept every bonus which had been declared, was worth to-day something like £4,500, even at the present depreciated price of the stock, he did not think that it could fairly be said that the directors had failed.

THE PETROL TAX

They were directly affected by two features of the last Budget, income tax and petrol tax. The effect of income tax on a company such as theirs, which retained a large portion of its profits, was that it had to earn more money in order to show the same result to the stockholders. He would probably have something more to say on that point next year. As to petrol tax, the companies with which they were associated were probably the largest buyers of petrol in the country and a penny per gallon spread over a year meant a very large sum indeed. Their attitude to that tax was that they regarded petrol as a manufacturer regarded his raw material; in fact, it was their raw material. Every tax could be regarded as a necessary evil, but it seemed to him that this tax was rather more evil and rather less necessary than usual, because it was a tax on industry. It was probably not generally realised how large a part transport played in the cost of manufactures.

The petrol tax also affected them in another way; they had a small interest in an aviation company which was trying to make a profit from running air services without a Government subsidy.

LAUNDRY AND OMNIBUS INTERESTS

They had taken an interest in laundries and were going to see whether they could possibly do the washing for small householders more cheaply than could be done themselves at home. Well, this had proved more difficult than imagined, and the rise in wages and materials did not help. Still, they were perfectly satisfied with their incursion into that business.

It was very difficult to say anything in general terms about the omnibus business only to say that in the past year expenses had gone up, owing mainly to increase of wages, but, on the whole, they had been met by an increase of receipts, so that they had come out fairly square.

They must not expect a continuance of the phenomenal increases which they had had during the past two years, but there was no reason why they should not show at least a moderate increase in the current year.

The report and accounts were unanimously adopted. 1455

NOTICE

Advertisements for classified columns MUST reach us by

5.30 P.M. ON TUESDAY

E.R.6

Important to applicants for Situations Vacant—

ORIGINAL TESTIMONIALS should *NEVER* be sent with applications.

E.R.3

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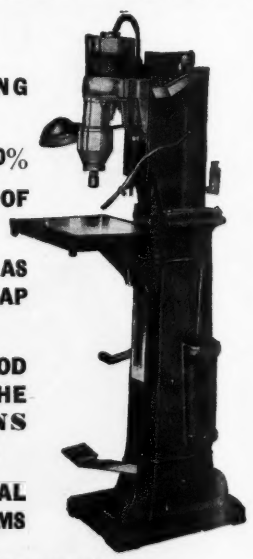

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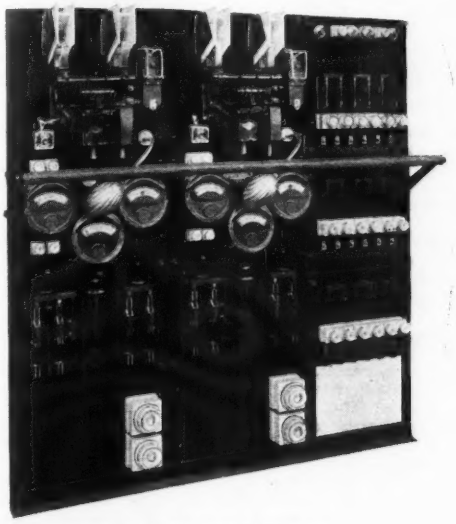

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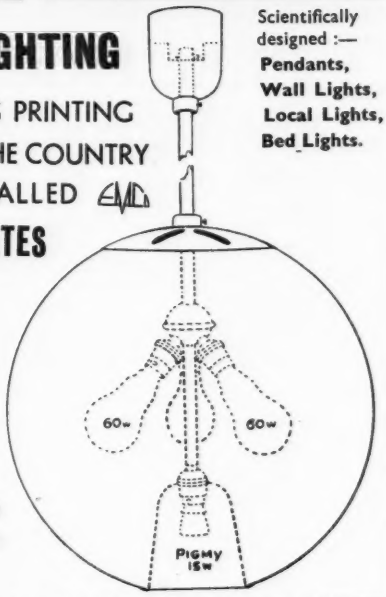

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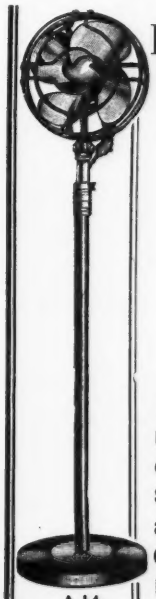

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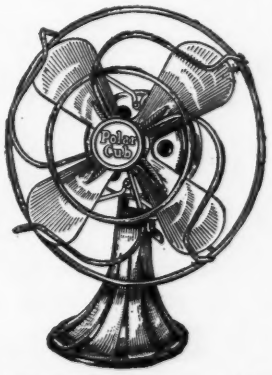

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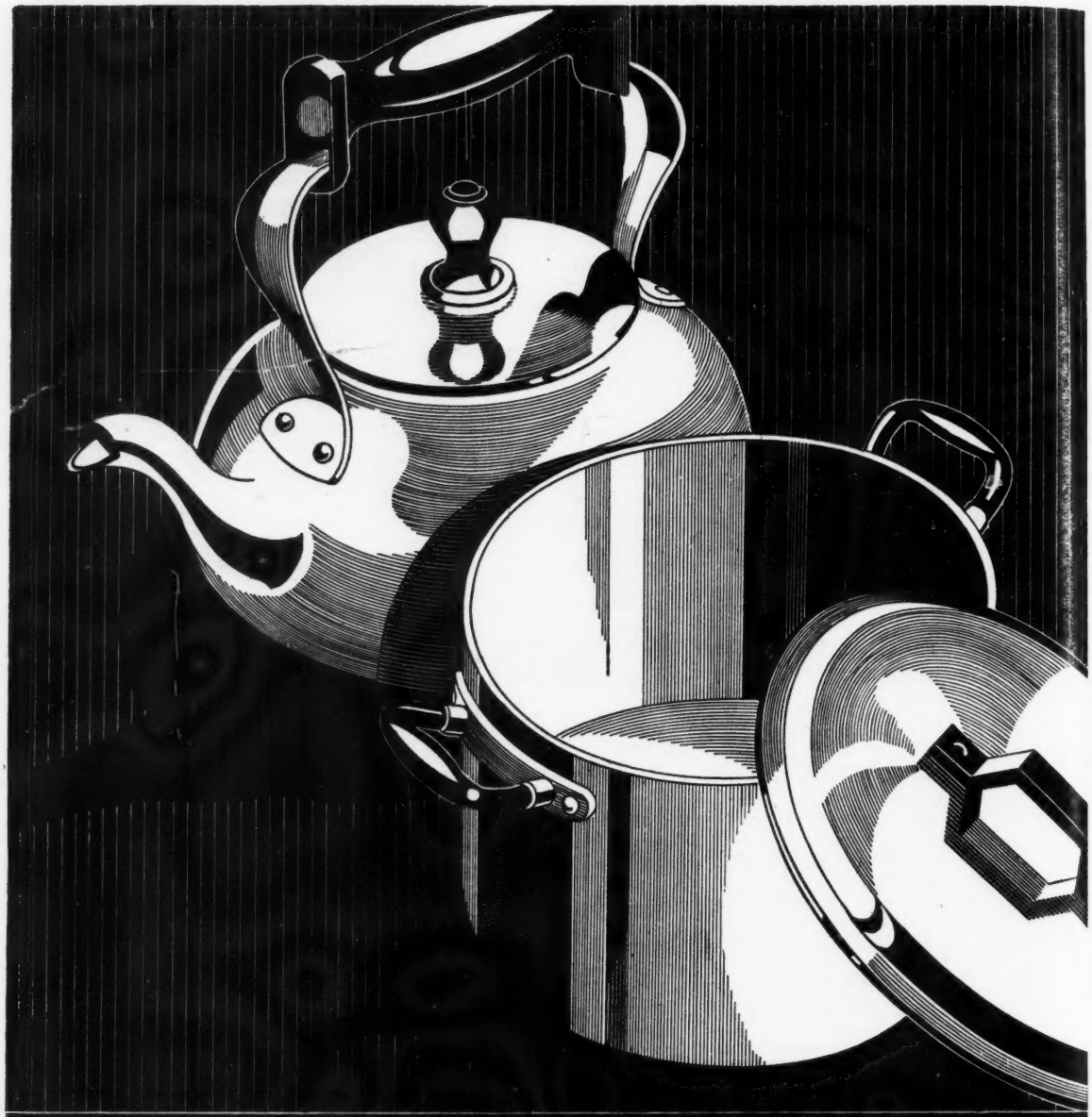

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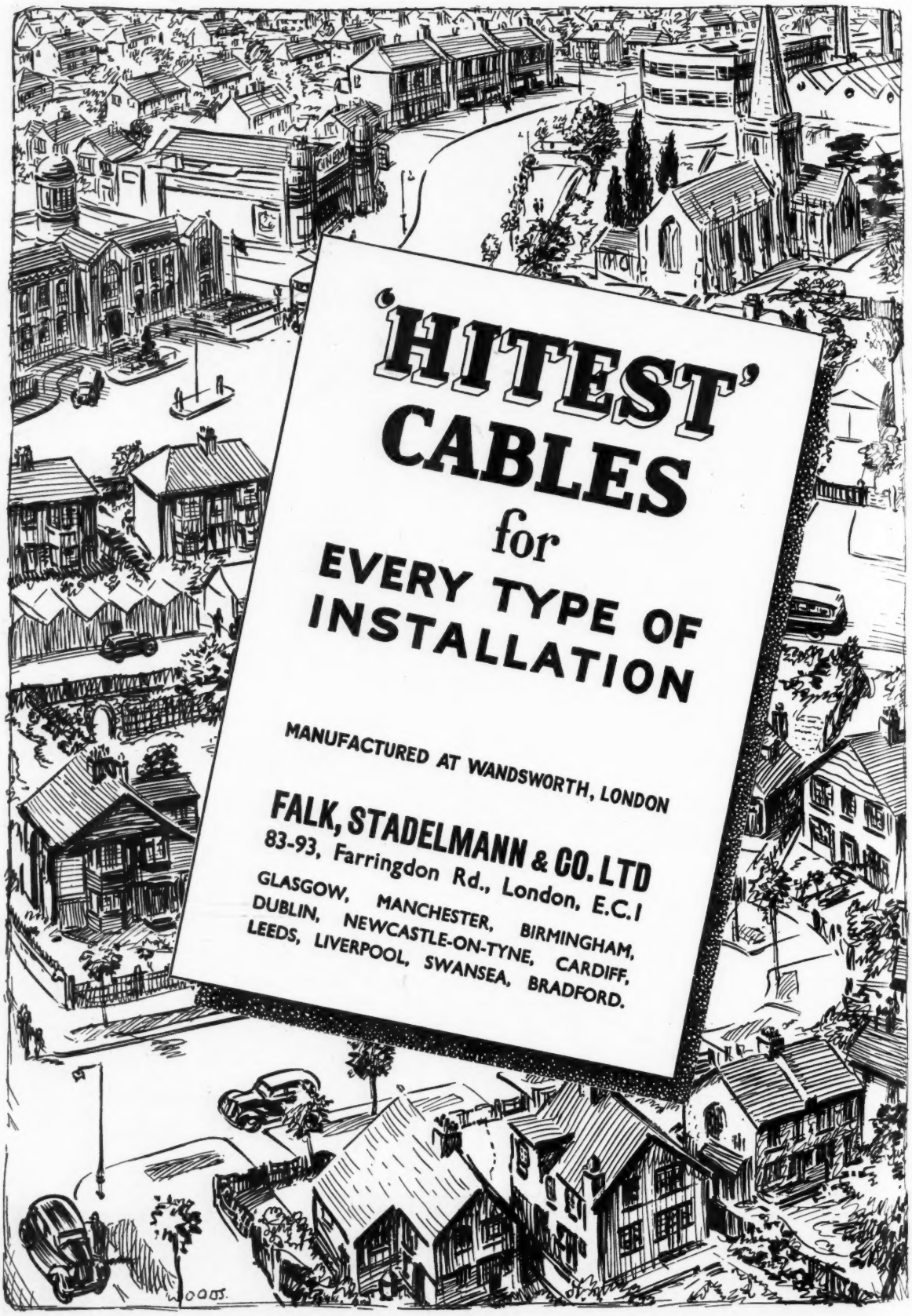
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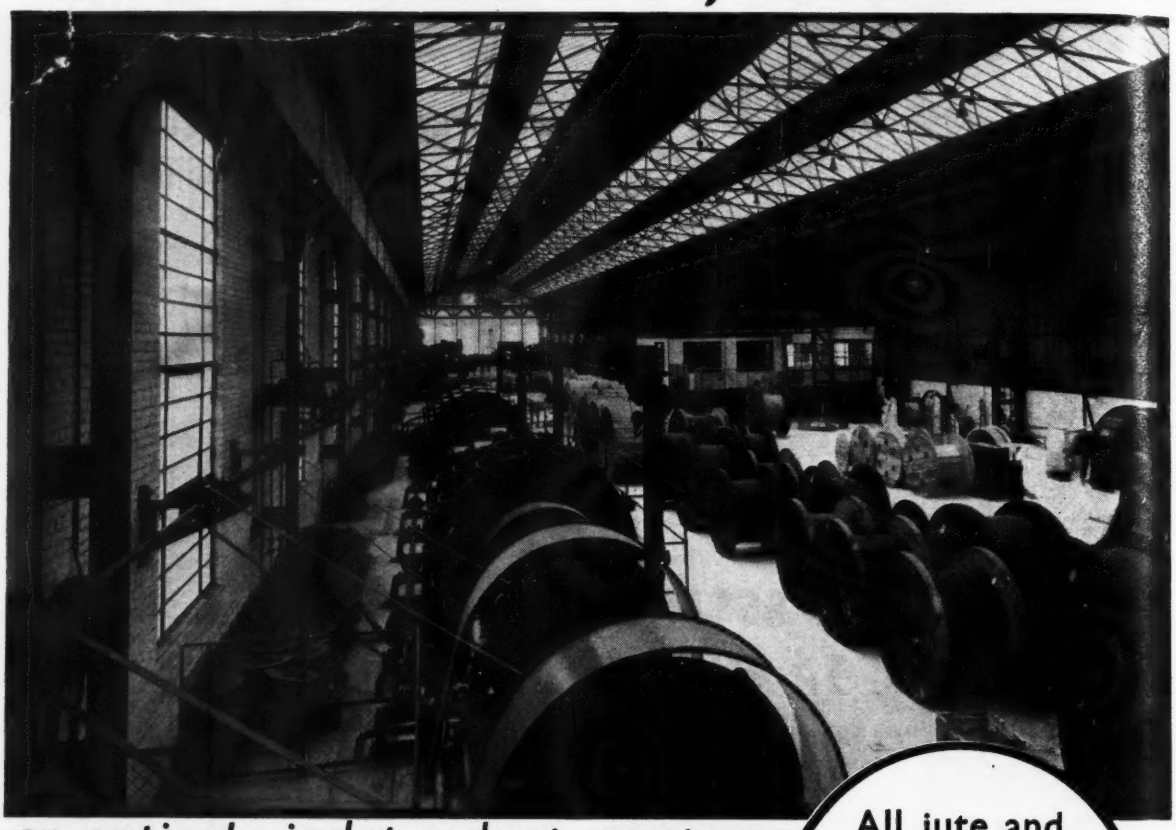

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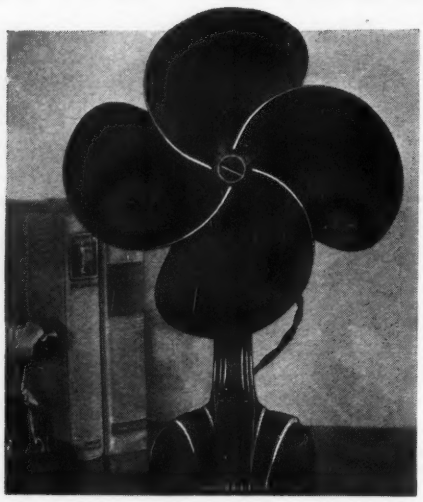

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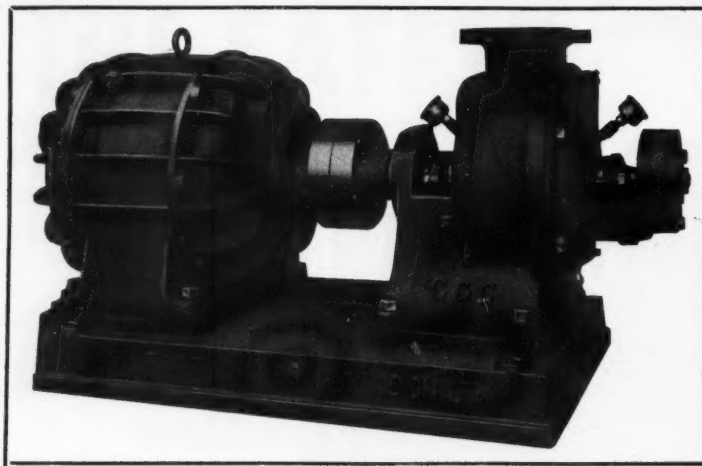

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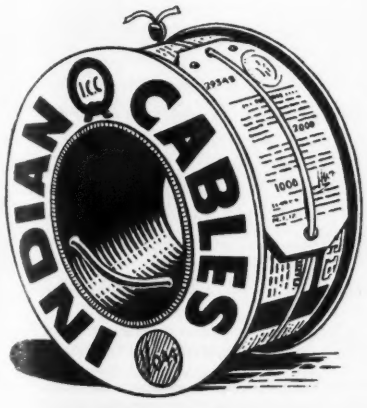

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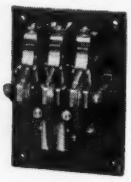

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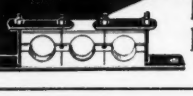

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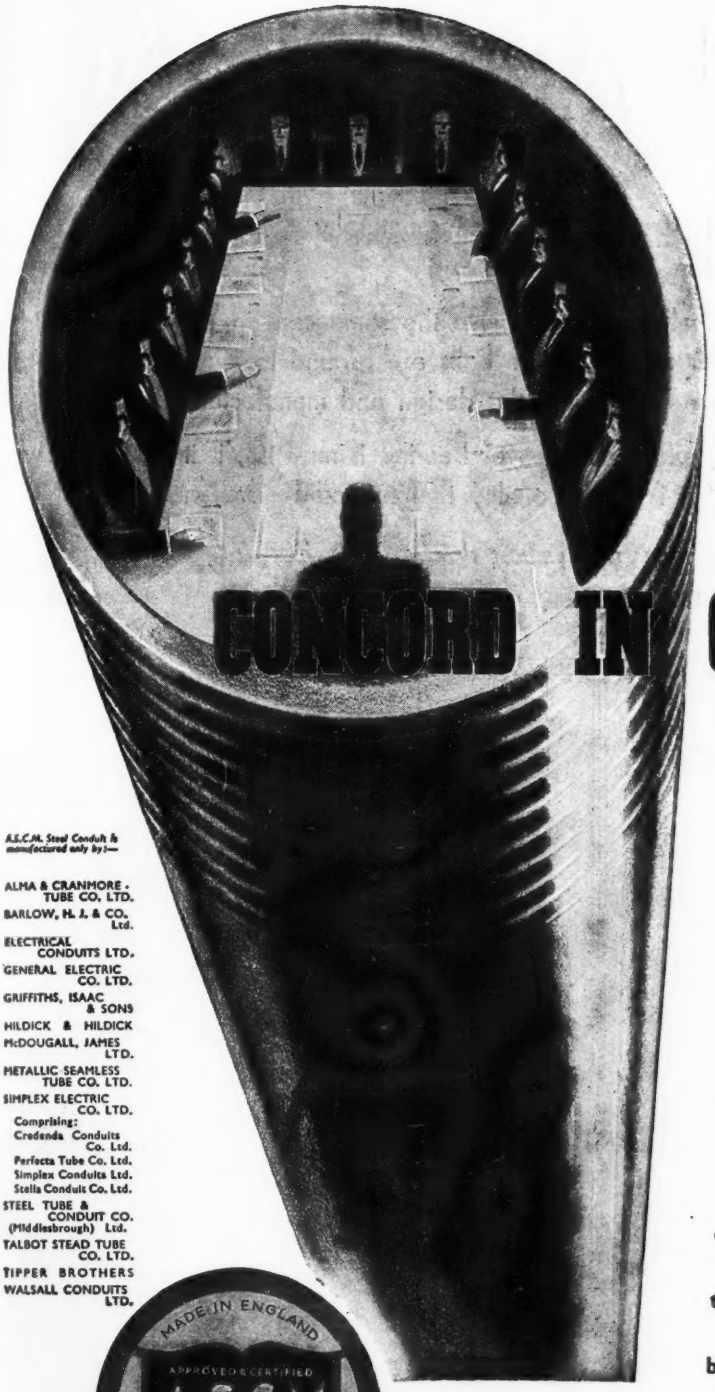

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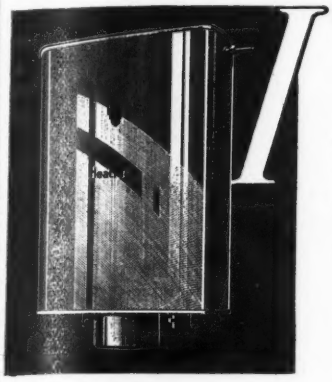

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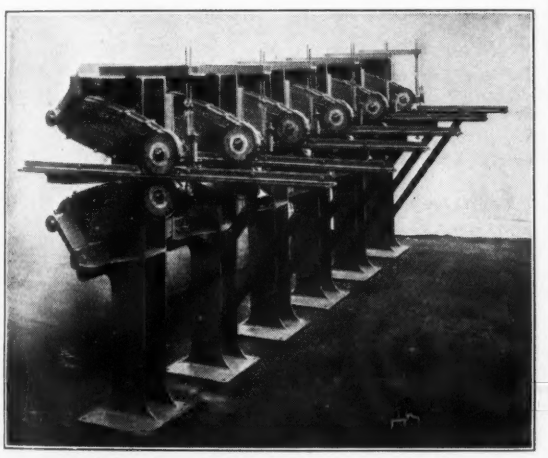

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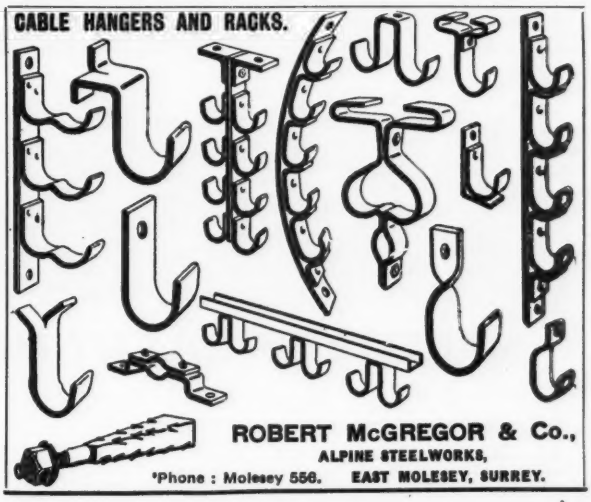

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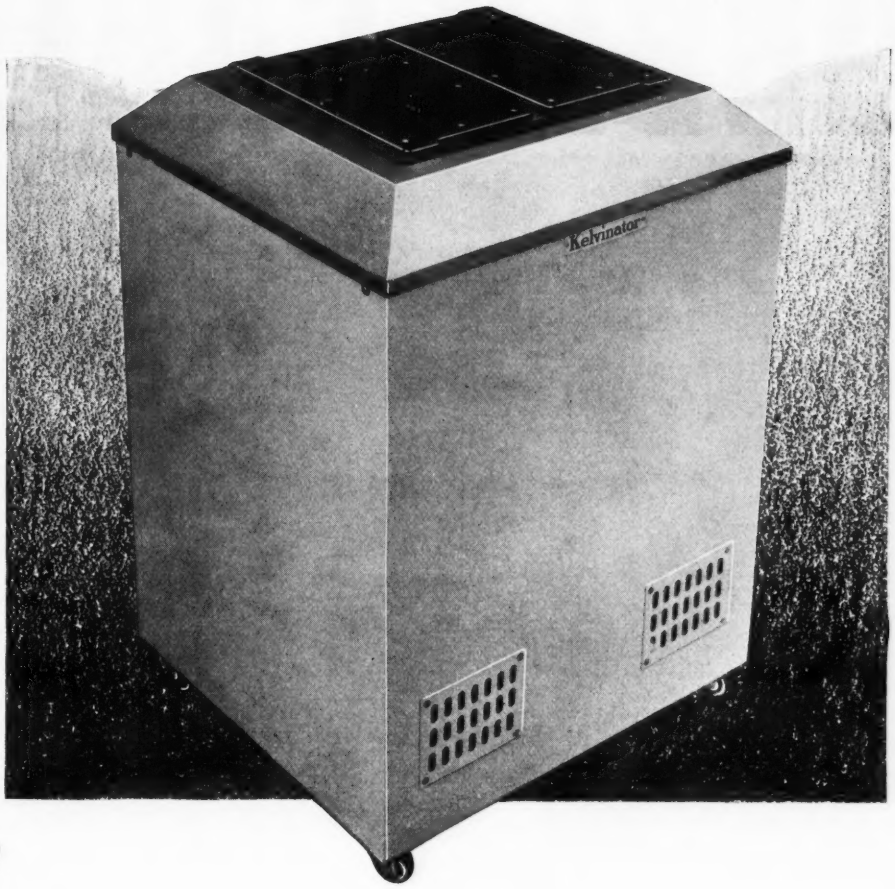

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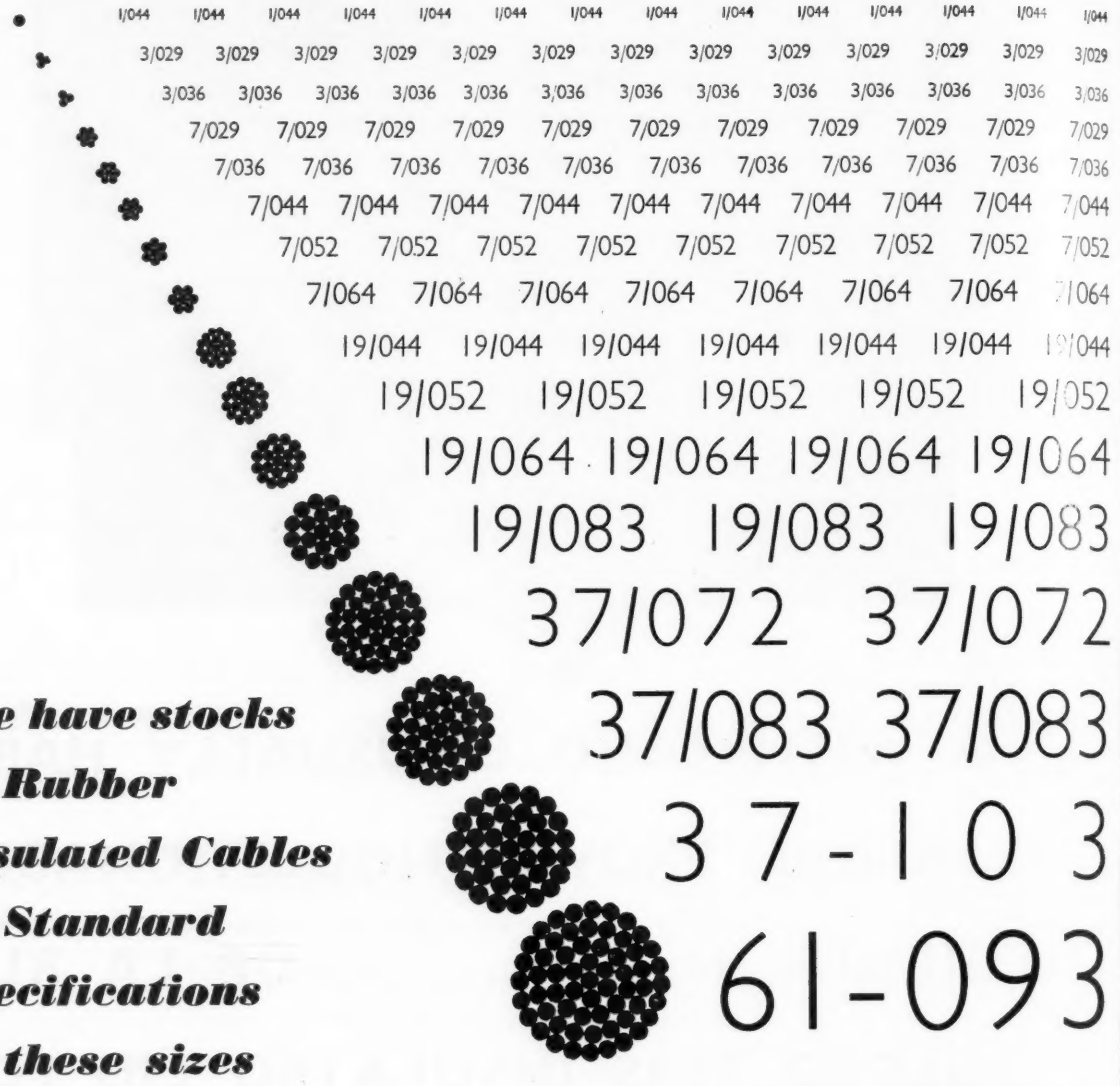

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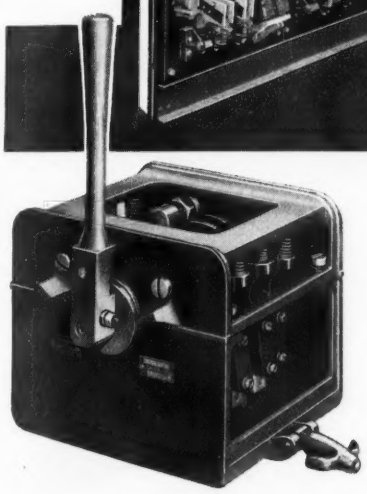

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- One size for all motor ratings—minimum number of spares and easy maintenance.

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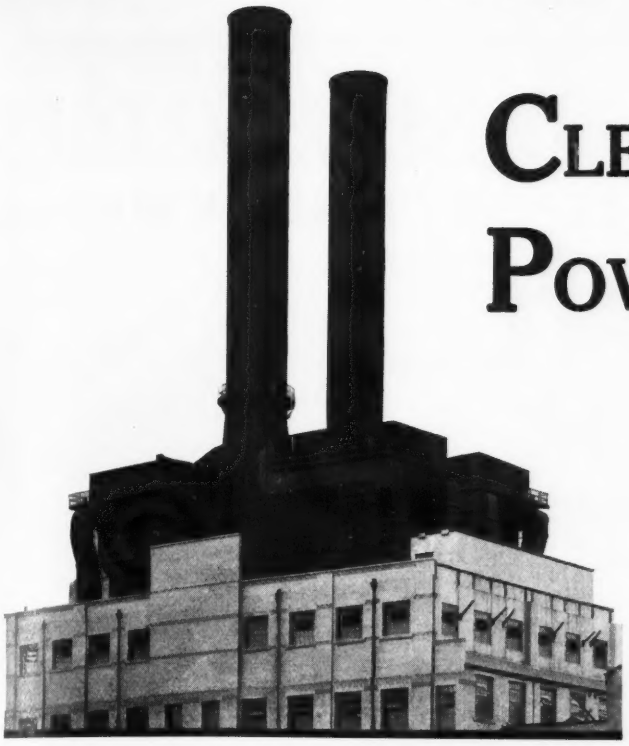
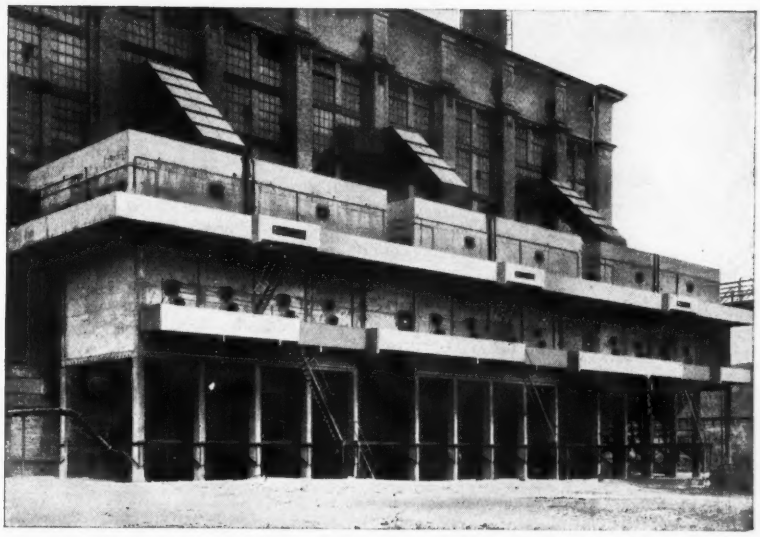


CLEAN POWER STATION STACKS

WITH

STURTEVANT PRECIPITATORS

The top picture shows the 4 Sturtevant Precipitators on the roof of the North Wilford Power Station, Nottingham, while on the right is shown the 3 Sturtevant Precipitators installed at Kirkstall Station, Leeds.



STURTEVANT ELECTROSTATIC PRECIPITATORS IN POWER STATIONS

North Metropolitan Power Station Co. Ltd., Brimsdown	2
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City of Nottingham Elec. Dept., North Wilford Station	4
City of Leeds Elec. Dept., Kirkstall	3
City of Leicester Elec. Dept., Freeman's Meadow	1
City of Leicester Elec. Dept., Freeman's Meadow (repeat)	2
County Boro. of Derby Elec. Supply, Full Street	1
County Boro. of Derby Elec. Supply, Full Street (repeat)	1
County Boro, of Derby Elec. Supply, Full Street (repeat)	1
County Boro. of Derby Elec. Supply, Full Street (repeat)	1
County Boro. of Derby Elec. Supply, Full Street (repeat)	2
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These plants handle more than double the gas volume of any other British make on similar duty.
Sturtevant Power Station Precipitators positively stop flue dust emission—particulars are given in our publication U1494.

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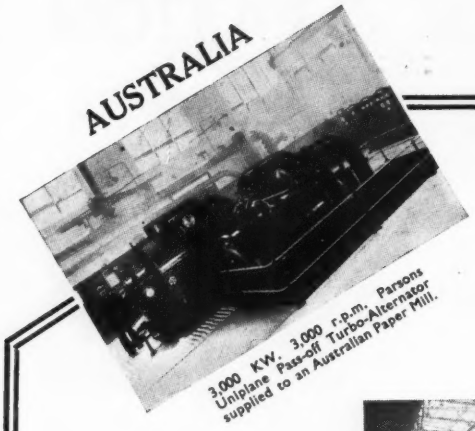

3,000 KW. 3,000 r.p.m. Parsons Uniflane Pass-off Turbo-Alternator supplied to an Australian Paper Mill.

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5,000 KW. Parsons Back Pressure Turbo-Alternator, supplied to the Ford Motor Company of Canada Ltd.

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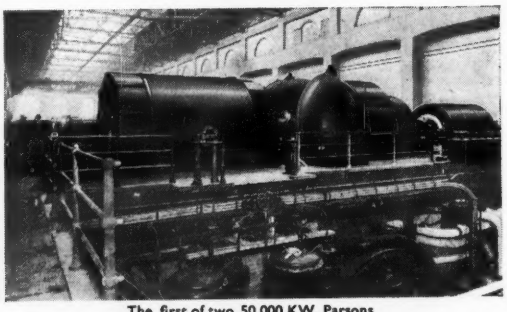

The first of two 50,000 KW. Parsons Turbo-Alternators supplied to the Glasgow Corporation Electricity Department and installed in their Dalmarnock Power Station.

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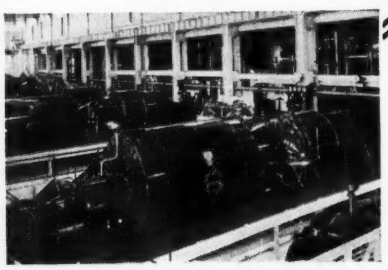
INDIA



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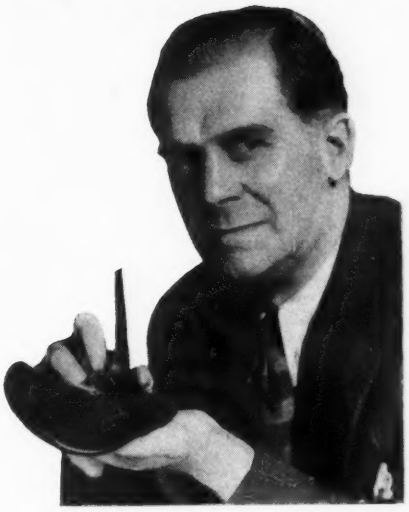
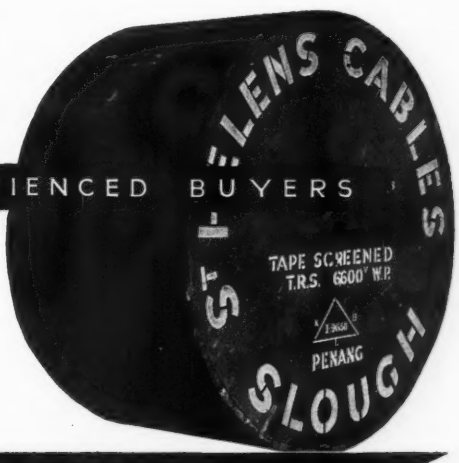


"The other day a man walked into my office and talked to me on the subject of trailing cables. *His* trailing cable was the best thing that had ever happened. *His* trailing cable made other trailing cable look like chewed string. What about an order? Well, to be frank, he didn't get an order, The reason? Simple. In my job I can't afford to experiment with unknown quantities. That may sound as if I'm a bit of a die-hard about it, but when men's lives may depend on my judgment I've *got* to play for safety. That man's cable was probably everything he claimed for it (even to the bit about the chewed string, though I doubt that) but I have to leave the trying-out to others. I need cable that I have *proved* absolutely reliable; cable, moreover, that stays reliable. St. Helens have been making C.T.S. since I was a lad, and I *know* that when I put in a run of their cable I'm putting safety first. I can see no reason for changing that policy."

ST. HELENS

THE LOGICAL CHOICE OF EXPERIENCED BUYERS



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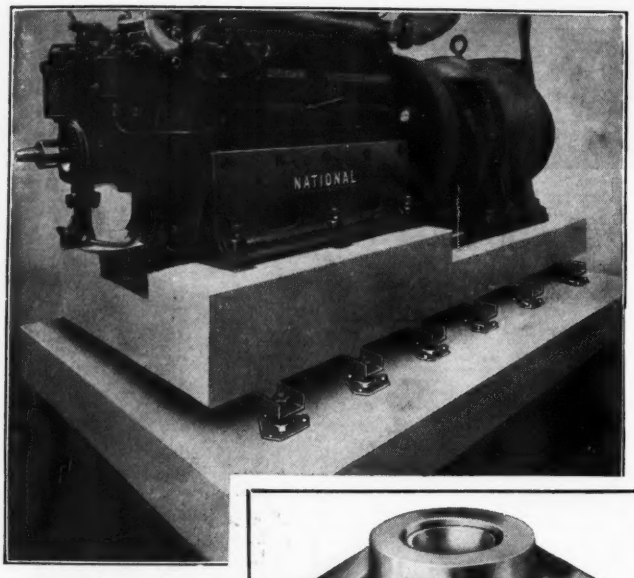
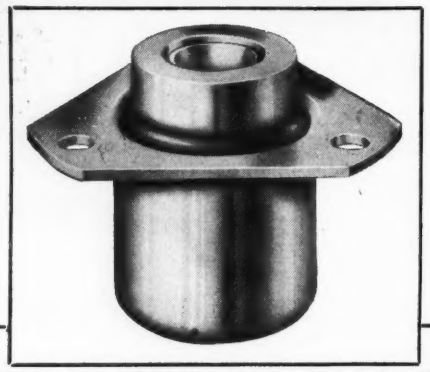


Generating Set mounted on SILENTBLOC ANTI-VIBRATION MOUNTINGS.



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ANTI-VIBRATION MOUNTINGS

These mountings have been designed to afford an easy and efficient method of absorbing vibrations from all types of internal combustion engines, air compressors, marine, electrical and ventilating machinery, etc.

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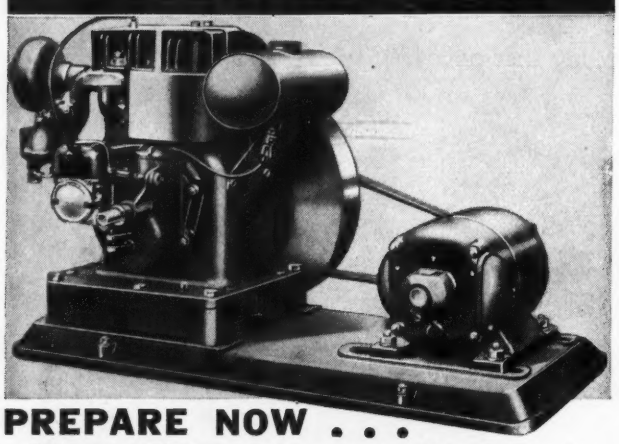

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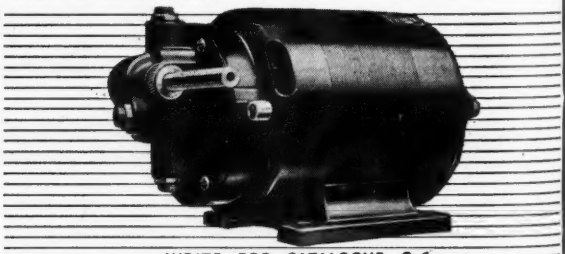
CROYDON F·H·P MOTORS

OF OUTSTANDING DESIGN AND ENDURANCE, BUILT BY SPECIALISTS



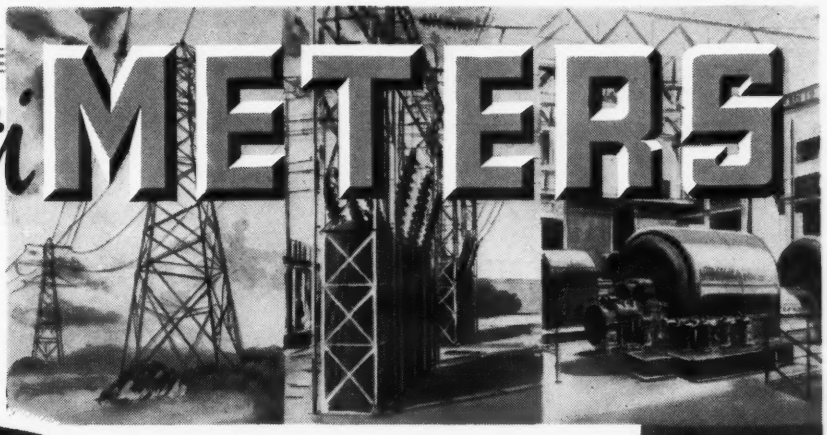
WRITE FOR CATALOGUE G.6

CROYDON ENGINEERING CO. LTD.

SYNCROY WORKS,
COMMERCE WAY, PURLEY WAY, CROYDON

Telephone No.: Croydon 4125-8.
Telegraphic Address: Syncroy, Croydon.

Ferranti METERS



LOW WEIGHT—SMALL BULK

Ferranti Meters represent an achievement in compactness of design and accuracy of measurement. This results from 50 years of continuous experiment—mostly of a pioneer nature. Ferranti Meters have always led the way.

FERRANTI LTD., HOLLINWOOD, LANCS.
London Office : BUSH HOUSE, ALDWYCH, W.C.2

FL Single Phase **METER**

FLY & FLX Polyphase **METERS**

FANS

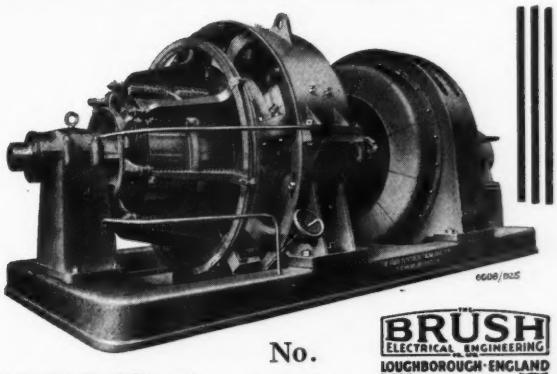
MAKE YOUR SELECTION FROM OUR EXTENSIVE STOCKS

Wall, Desk and Ceiling types in a variety of finishes are included in the range of fans carried at all branches. The "*Handybreeze*" series in sparkling black crackle or cellulose will appeal to your customers if only by virtue of the low price —from **13/6** list for an 8" non-oscillating fan.

Brown Brothers Limited
ALLIED COMPANIES
THOMSON AND BROWN BROTHERS LIMITED
BROWN BROTHERS (AIRCRAFT) LTD. BROWN BROTHERS (IRELAND) LTD.
Head Offices and Warehouses (Wholesale only):
BROWNS BUILDINGS, GT. EASTERN ST., LONDON, E.C.2.
126, GEORGE STREET, EDINBURGH 2, and branches.

A 2,500 kW BRUSH Motor Converter supplied to the Luton Corporation Electricity Works.

BRUSH Motor Converters



Supplied with outputs from 500 kW. upwards

"BRUSH" Motor Converters are outstanding among large capacity converting plant on account of their reliability and ease of starting. They have high over-load capacity and high stability which enables them to cope successfully with heavy load and voltage fluctuations, especially during unforeseen disturbances which may occur in any power system.

3-19 *Write TO-DAY for our NEW Publication.* No. CB5

BRUSH ELECTRICAL ENGINEERING LOUGHBOROUGH · ENGLAND

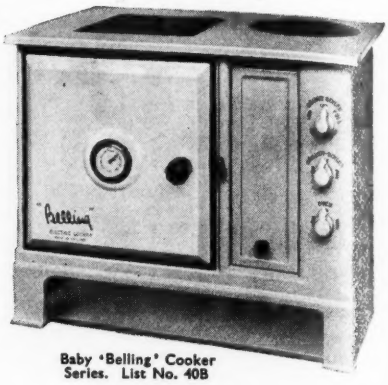
'BELLING'

electric cookers

FOR HIRE, HIRE PURCHASE & CASH SALES

Baby 'Belling' Cooker Series. List No. 40A

Baby 'Belling' Cooker Series. List No. 40



Baby 'Belling' Cooker Series. List No. 40B

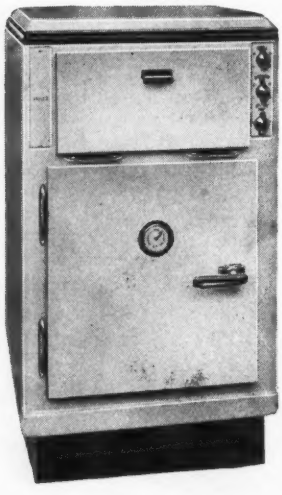
There's a 'BELLING' COOKER for every home!

Standard Cooker Series. List No. 43A

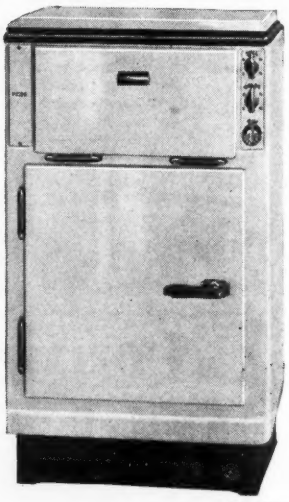
Standard Cooker Series. List No. 44A

New 'Streamline' Cooker Series. List No. 66

New 'Streamline' Cooker Series. List No. 63AB



New 'Streamline' Cooker Series. List No. 63

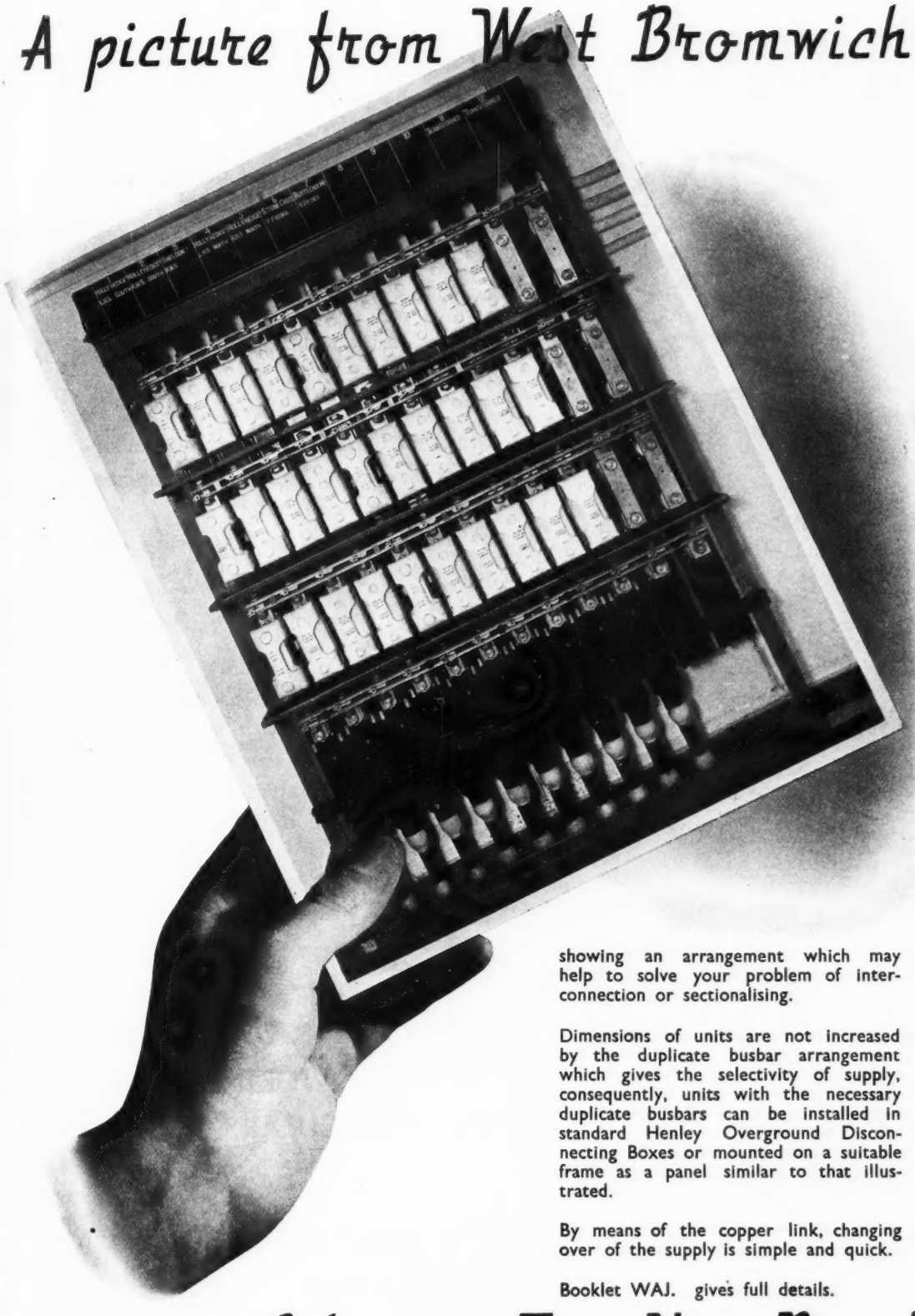


'Belling'

BELLING & CO. LTD., Bridge Works, Southbury Rd., Enfield, Middlesex. Telephone: Howard 1212 (7 lines).
London Showrooms: 313, Regent Street, W.1 (1 minute north of Oxford Circus).

C.R.C.218

A picture from West Bromwich



showing an arrangement which may help to solve your problem of interconnection or sectionalising.

Dimensions of units are not increased by the duplicate busbar arrangement which gives the selectivity of supply, consequently, units with the necessary duplicate busbars can be installed in standard Henley Overground Disconnecting Boxes or mounted on a suitable frame as a panel similar to that illustrated.

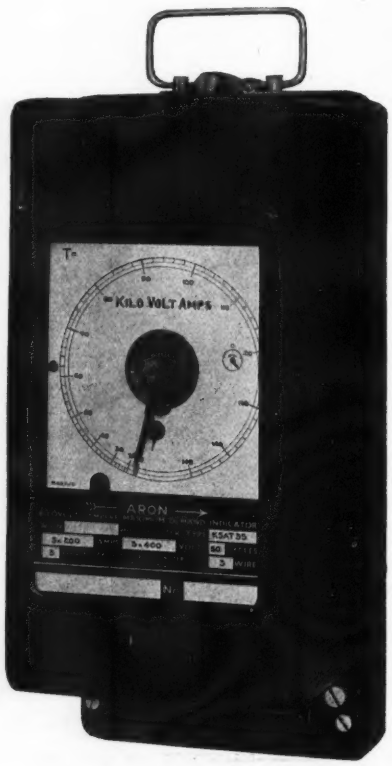
By means of the copper link, changing over of the supply is simple and quick.

Booklet WAJ. gives full details.

HENLEY Selective Type Unit Panels

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD. HOLBORN VIADUCT, LONDON, E.C. 1.

A NEW kVA DEMAND INDICATOR



THE HILL-SHOTTER kVA MAXIMUM DEMAND INDICATOR (Declared Voltage pattern) as known since 1920 has been completely redesigned, and is now available under the following type designations:—

KSA . . . with synchronous motor trip;
KRA . . . with relay trip.

The principal modifications incorporated in the new design are:—

(i) Greatly reduced size and weight.
(ii) Simplified general construction.
(iii) Improved modern M.D.I. mechanism, with
(iv) Up-to-date synchronous motor tripping.

IF YOU HAVE A kVA TARIFF IN PROSPECT OR IN OPERATION IT WILL BE WELL WORTH WHILE TO WRITE FOR FURTHER PARTICULARS FROM THE MANUFACTURERS:—

ARON ELECTRICITY METER LTD.

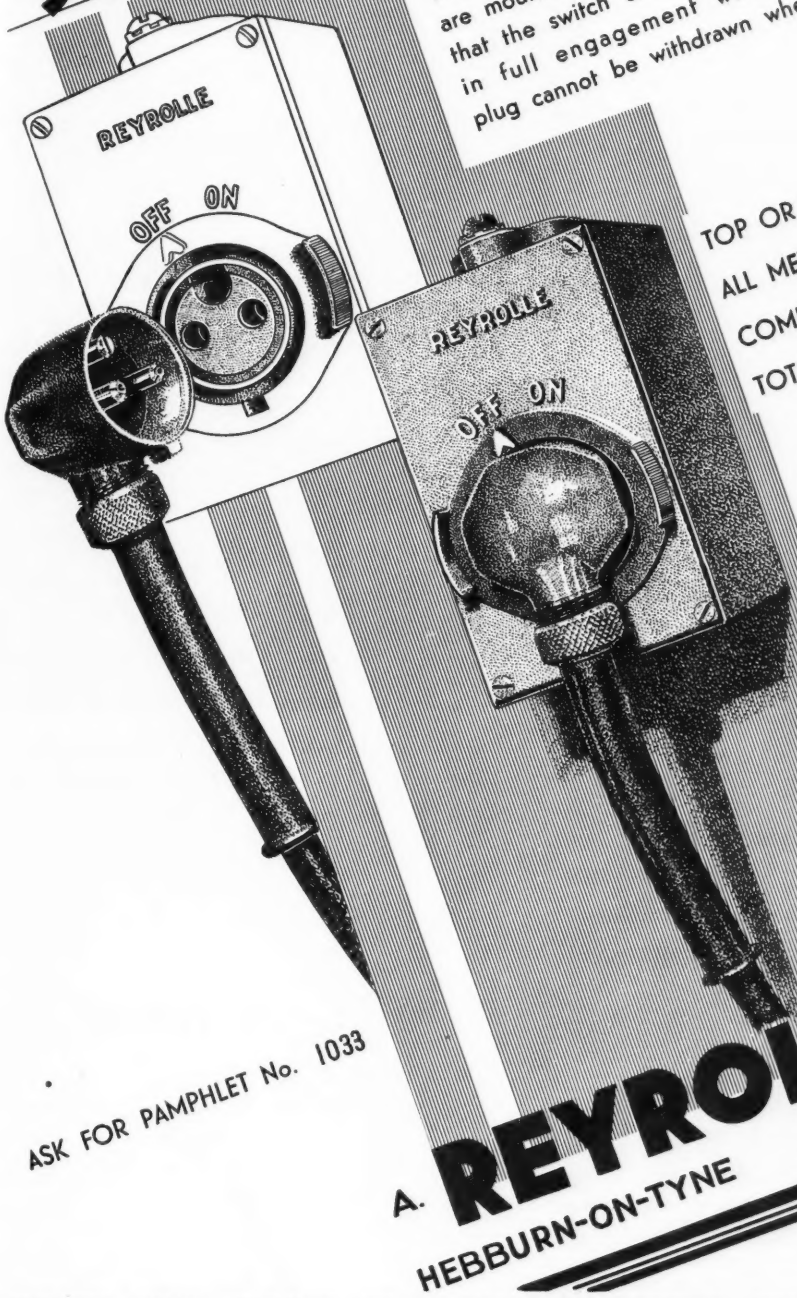
72-82, SALUSBURY ROAD, KILBURN, N.W.6.

Telephone - - - - MAIDA VALE 0182-3-4-5-6.

METAL-CLAD DOUBLE-POLE SWITCH-AND-PLUG UNITS

5 AND 15 AMPERES 250 VOLTS

The component parts of these switch-and-plug units are mounted in a metal case, and are so interlocked that the switch cannot be closed unless the plug is in full engagement with the socket, and the plug cannot be withdrawn when the switch is closed



TOP OR BOTTOM CONDUIT-ENTRY
ALL METAL PARTS EARTHED
COMPLETELY INTERLOCKED
TOTALLY ENCLOSED

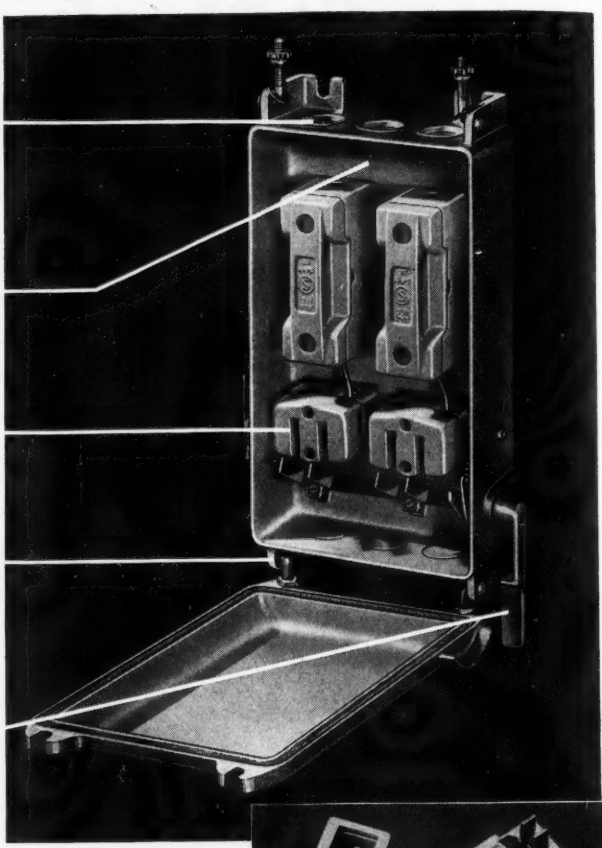
ASK FOR PAMPHLET No. 1033

A. REYROLLE & CO LTD
HEBBURN-ON-TYNE ENGLAND

STANDS E46/47, PALACE OF ENGINEERING, EMPIRE EXHIBITION, GLASGOW.

A NEW RANGE OF SWITCHES & SWITCH FUSES

FOR ORDINARY OR H.R.C. DUTY



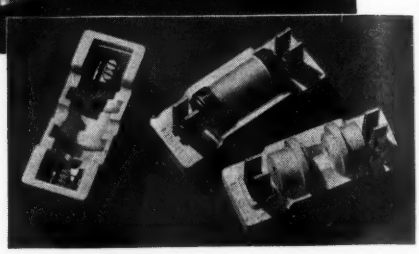
Three knockouts, top and bottom, providing any wiring combination.

Abundant cable room everywhere.

Fully protected, but easily accessible contacts.

Four point adjustable lid hinges, packed lid and hose-proof case.

Pressure die cast operating handle free of all play.



SANDASPEED DUPLEX FUSE FITTED AS STANDARD ABOVE IS AMP. CAPACITY.

"SANDAMAX"

The "Sandaspeed" Duplex Fuse comprises a base, which will accept either a 'W.L.' type rewireable semi-enclosed pattern carrier, or a 'C.L.' type carrier designed to accommodate "English Electric" or "Reyrolle" H.R.C. fuse cartridges. It will be seen that Switch Fuses fitted with these units are immediately adaptable to any class of duty with resultant simplification of stocks.

WRITE FOR FOLDER 127

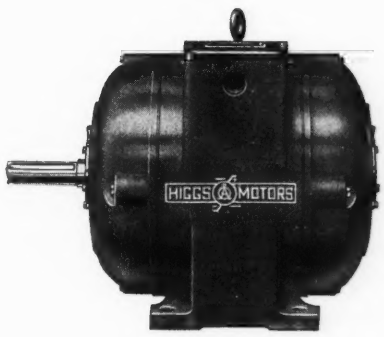
Sanders

SWITCH AND FUSE GEAR

WILLIAM SANDERS & CO. (WEDNESBURY) LTD
FALCON ELECTRICAL WORKS, WEDNESBURY, STAFFS.
London Office: 78, Neal Street, W.C.2

SERVICE IN ALL SENSES

TRADE
HIGGS MOTORS
GOVERNING DIRECTOR WALTER F. HIGGS, M.I.E.E. LTD
MARK
BIRMINGHAM.6 ENGLAND



THESE HARD TIMES . . .

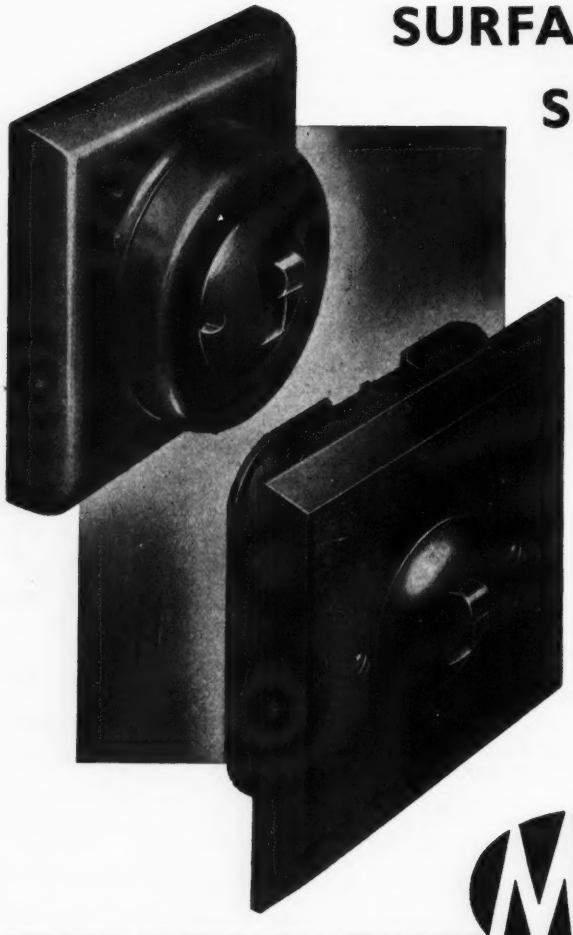
Everybody is talking "slump," but we find it necessary to erect another 14,000 square feet of buildings in order to meet the demand for our well-known products. Extensions annually for the last eleven years.

HIGGS MOTORS lead the way because they are GUARANTEED FOR EVER!

Birmingham, Bristol, Cardiff, Dundee, Glasgow, Leeds, Liverpool, London, Manchester, Newcastle, Nottingham, Peterborough, Sheffield, Wolverhampton.

B

a NEW RANGE of QUALITY SWITCHES



SURFACE SEMI-SUNK AND SUNK UNITS

Completely redesigned, the M.K. 5 amp. Slot Switch is delightfully smooth to operate and amazingly efficient for either A.C. or D.C. circuits.

The general appearance of the Surface and Semi-Sunk has been completely modernised, but 2-inch diameter bases have been retained to suit standard mounting blocks. A new square bakelite mounting block is available for the Semi-Sunk Switch, making an attractive combination which costs little more than the ordinary Surface Switch.

New Sunk Units have EXTRA shallow boxes — no deeper than normal plaster thickness. Adjusting pillars enable quick and easy alignment between switch and switchplate despite irregularities in plaster level. Boxes are available in Bakelite, Hardwood and Cast Iron (for round or oval conduit).

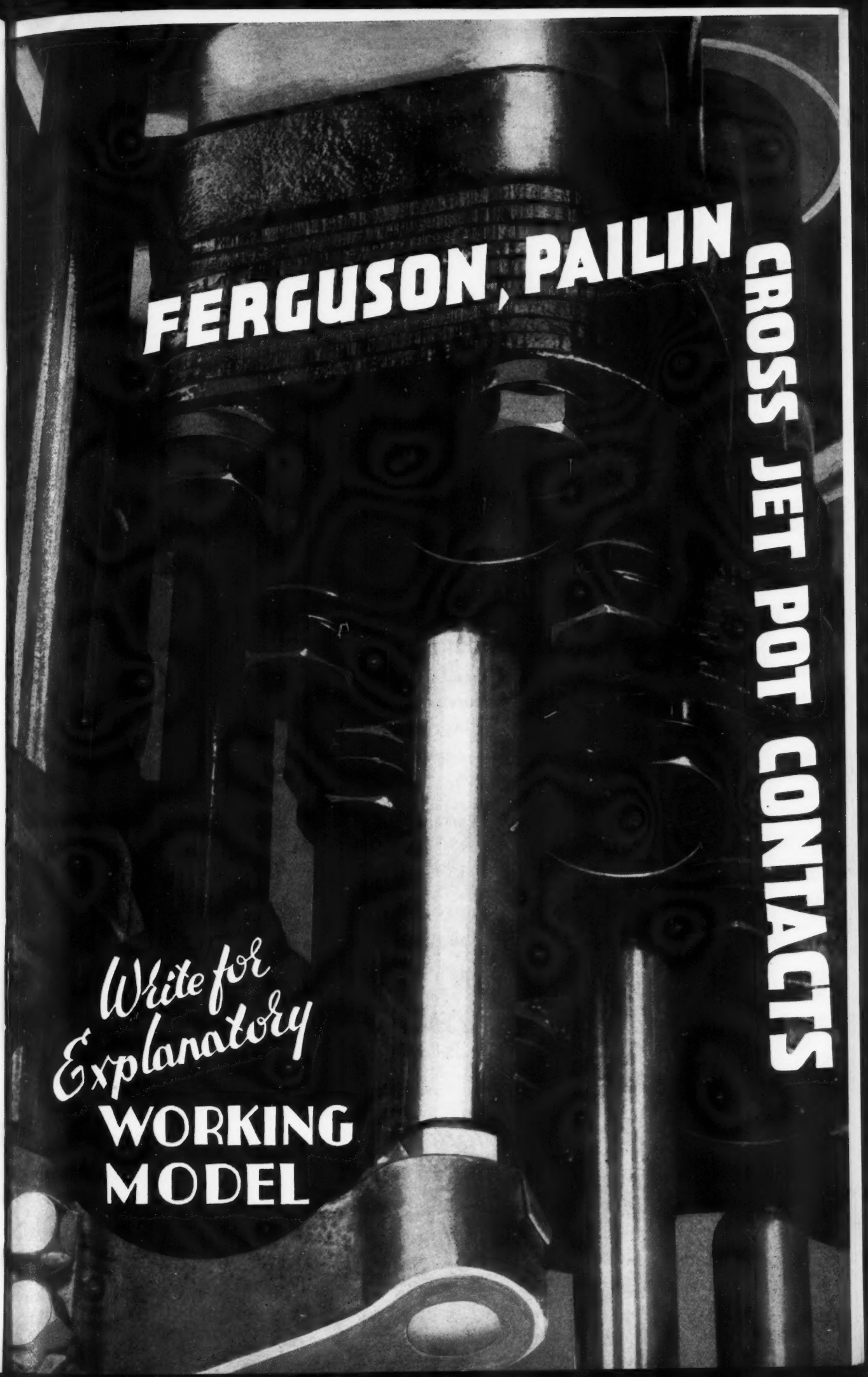
Have you received your copy of Brochure No. 180 ?

MK 'Slot' Switches

M.K. ELECTRIC LTD., WAKEFIELD STREET, EDMONTON, LONDON, N.18

Telephone : TOTTENHAM 3056 (4 lines) and 2992 Telegrams : MULTICONTA, SOUTHTOT, LONDON

M.K. 97A


FERGUSON, PAILIN
CROSS JET POT CONTACTS
Write for Explanatory
WORKING MODEL

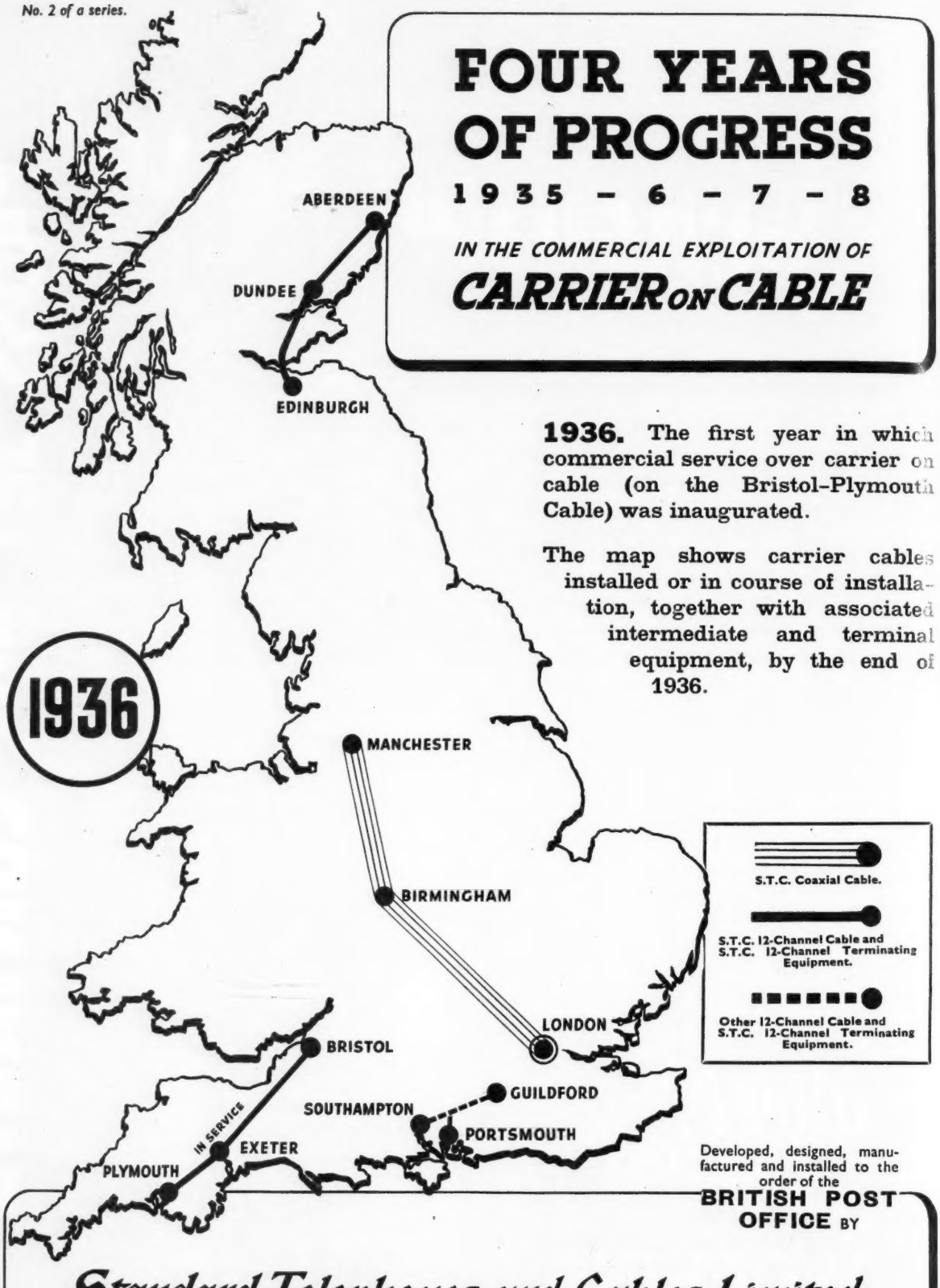
No. 2 of a series.

FOUR YEARS OF PROGRESS

1935 – 6 – 7 – 8

IN THE COMMERCIAL EXPLOITATION OF

CARRIER ON CABLE



1936. The first year in which commercial service over carrier on cable (on the Bristol–Plymouth Cable) was inaugurated.

The map shows carrier cables installed or in course of installation, together with associated intermediate and terminal equipment, by the end of 1936.

Developed, designed, manufactured and installed to the order of the **BRITISH POST OFFICE** BY

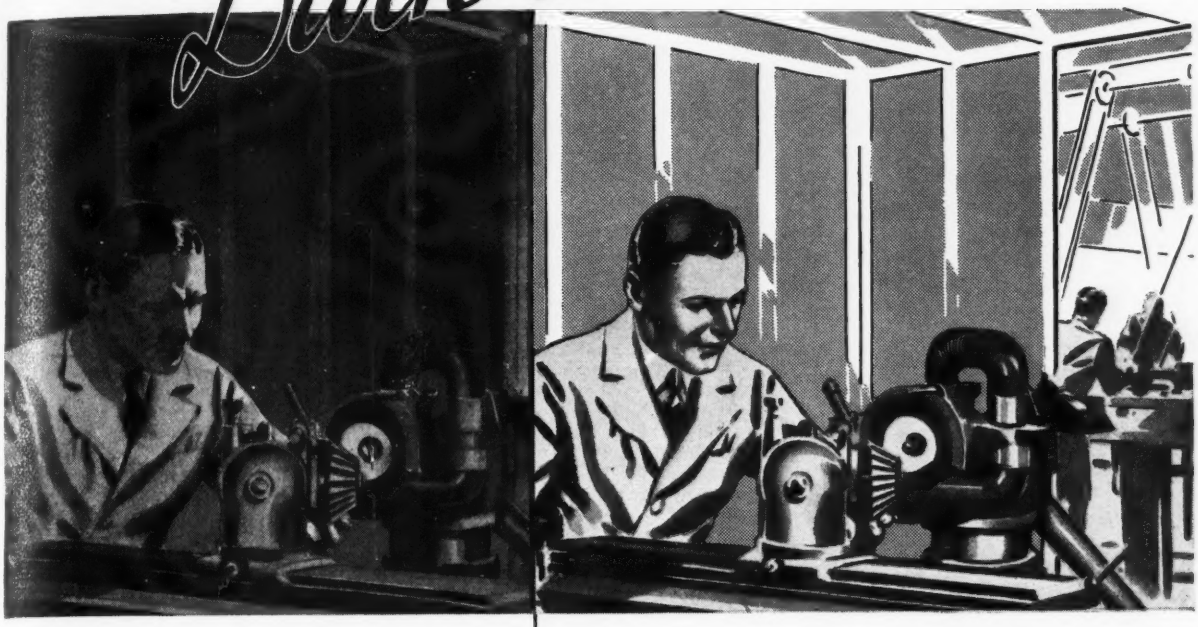
Standard Telephones and Cables Limited

NORTH WOOLWICH, LONDON, E.16.

Telephone: Albert Dock 1401.

BRANCHES & REPRESENTATIVES THROUGHOUT THE WORLD

ALUMINIUM PAINT BRINGS DAYLIGHT TO "Dark Corner" WORKERS



No machinist can do his best in bad light. Insufficient light strains his eyes, spoils his accuracy and causes errors that mar his output.

In an all-aluminium-painted factory, 60% to 75% of the light is reflected on the operator. His job is made easier, eyestrain is reduced and he does better work.

Aluminium paint is made up of minute overlapping metal 'leaves' that shine like a million tiny mirrors. This high reflectivity gives added daylight to factories, lights can be switched on later and need not be so powerful.

The peculiar metallic composition of aluminium paint has another valuable property — protection. It offers the greatest resistance to rust, corrosion and fumes. In addition, aluminium paint does not blister nor flake, lasts longer and retains its brilliance.

To get the best results

see that your contractor uses

Aluminium Paste

THE BASE OF THE FINEST ALUMINIUM PAINT

Please consult our Advisory Service for technical data on the use of aluminium paint in industry.

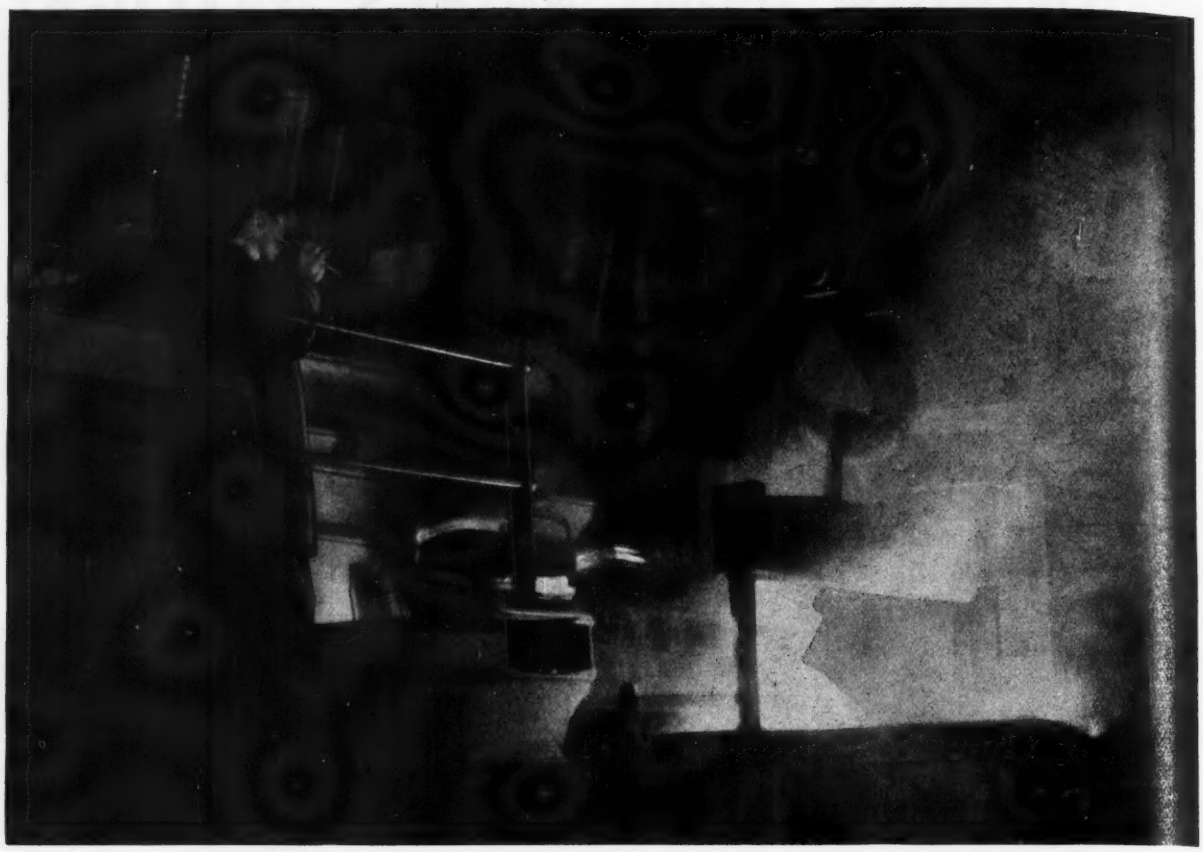
NORTHERN ALUMINIUM Co. Ltd.

BUSH HOUSE, ALDWYCH, LONDON, W.C.2 Telephone: TEMPLE BAR 8844 Telegrams: NORALUCO, BUSH, LONDON

and at BANBURY, BIRMINGHAM, BRISTOL, COVENTRY, GLASGOW, MANCHESTER, NEWCASTLE-ON-TYNE & SHEFFIELD

E.1.1

ELECTRIC MELTING FURNACE



BALDWINS

ELECTRICALLY MELTED SILICON STEEL

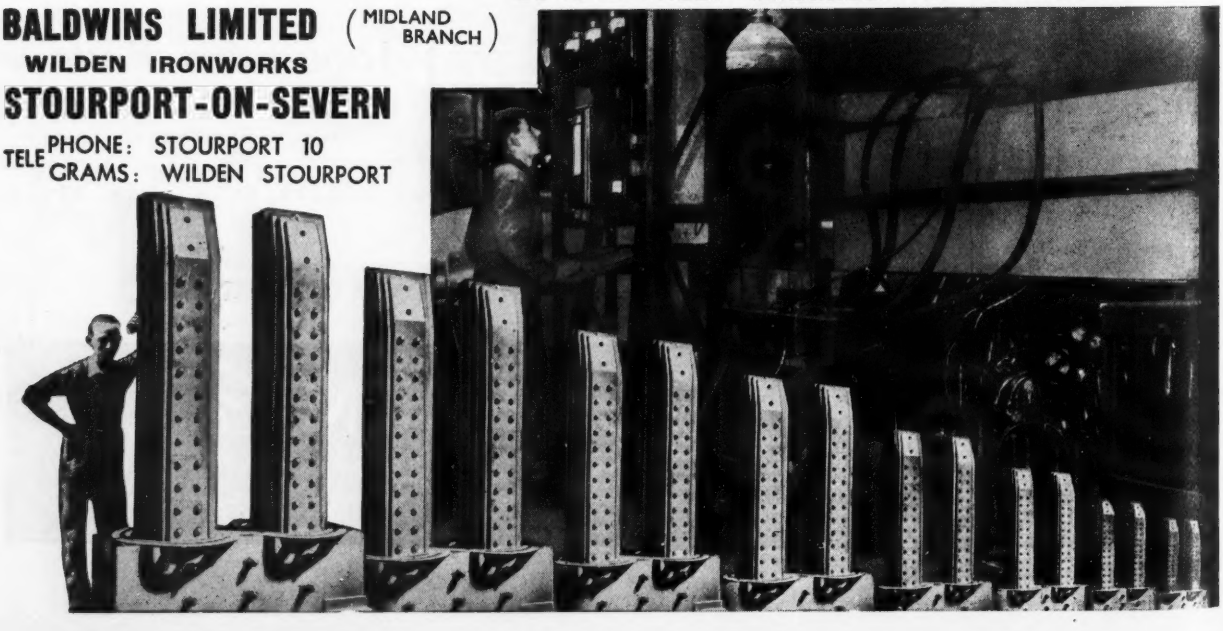
TRANSFORMER SHEETS & STAMPINGS

SPECIAL LOW LOSS and HIGH PERMEABILITY

IN ALL SIZES FOR ALL PURPOSES

ELECTRICALLY ANNEALED IN HYDROGEN

BALDWINS LIMITED (MIDLAND BRANCH)
WILDEN IRONWORKS
STOURPORT-ON-SEVERN
TELEPHONE: STOURPORT 10
TELEGRAMS: WILDEN STOURPORT



ANOTHER NEW ELLISON FLAMEPROOF CIRCUIT BREAKER

A larger flameproof circuit breaker with 100 amps capacity, and similar in design to the 40 amp size recently announced, is now available.

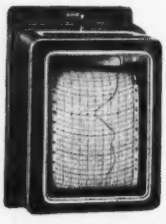
This oil-break circuit breaker is for use in any industry where the atmosphere is liable to become charged with an explosive mixture of methane, petroleum or acetone vapours. It conforms to the recent recommendations of H.M. Mines Department for mining switchgear. The sturdy construction makes it eminently suitable for the rough treatment likely to be given to apparatus in collieries. The design incorporates an interlocked isolator in the switch case, detachable sealing pots on the cable fittings and strong covers that give easy access to all parts for inspection and maintenance. Write for Descriptive List No. 28.

This NEW Ellison 100 amp. Flameproof Circuit Breaker has been awarded Mines Department Certificate No. FLP.1091.

GEORGE ELLISON LIMITED BIRMINGHAM 20 ENGLAND

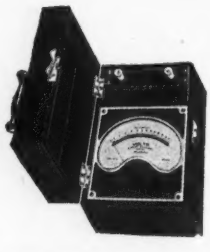
341

OTHER EVERETT EDGCUMBE PRODUCTS INCLUDE—



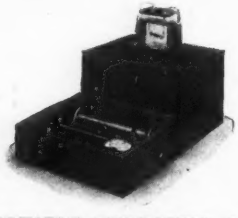
"INKWELL" GRAPHERS

To record Amperes—Volts—Watts—Power Factor—Frequency—Speed.



PORTABLE PRECISION "MU IRON" INSTRUMENTS

Capable of giving an accuracy in accordance with that set out for "sub-standard" instruments in the B.S.S. No. 89.



PORTABLE INSULATING OIL TESTER

A self-contained equipment for the rapid testing of switch and transformer oils as recommended in British Standard Specification.

RADIOLAB ALL-PURPOSE TESTER

A precision Moving Coil Meter, with exclusive Duplex scale, designed expressly for Radio Service.

SYNCLOCK SYNCHRONOUS WALL CLOCKS

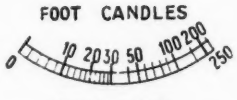
The self-starting Electric Clock with the "oil bath" motor

VEST POCKET LIGHTMETER

(PHOTO ELECTRIC)

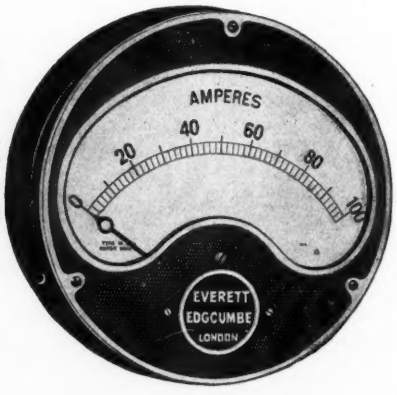
Notwithstanding its small size, the **Vest Pocket Lightmeter** has the characteristics of the larger "autophotic" portable photometers. The scale, a reproduction of which (full size) is shown, is specially designed to utilize to the best advantage the extreme handiness and portability of the metre.

It is extremely open at the lower end, thus enabling low illuminations to be read with accuracy, whilst higher illumination values can also be readily measured.



Specimen Scale Full Size.

"SUPERSCALE" AMMETERS & VOLTMETERS



are the original instruments with scales the same length as the dial side and have set a standard which remains above competition.

Superscale Instruments embody the following distinctive features :—

- Spring jewel suspension to give protection against hard usage.
- Small power consumption imposes negligible burden on current transformers.
- Effective damping ensures immediate response without overswing.
- Uniform appearance on all sizes and types.

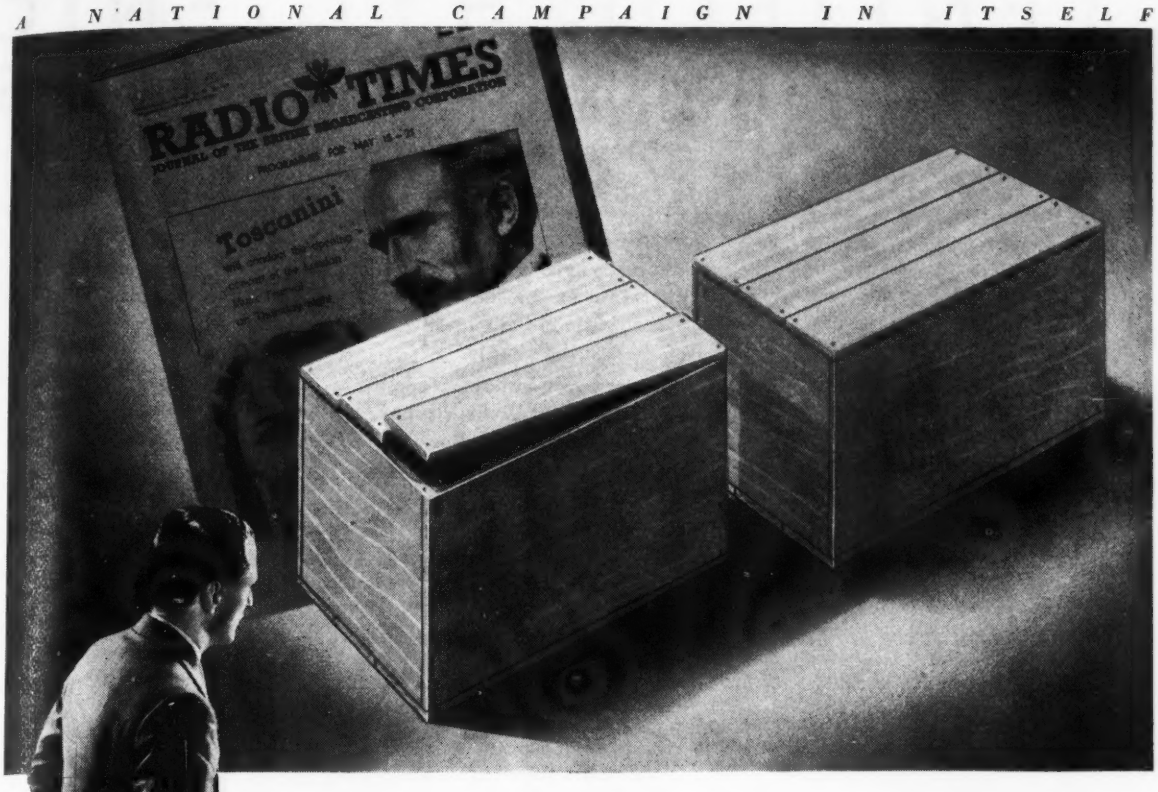
Write for Catalogue

EVERETT EDGCUMBE

Manufacturers of all kinds of indicating and recording electrical instruments and photometry experts

COLINDALE WORKS, LONDON, N.W.9

A NATIONAL CAMPAIGN IN ITSELF



"Both rattling good products

—YET I KNEW THE FIRST WOULD SELL

twice as fast"

"I'm not conceited. But I do pride myself on one thing. Knowing *beforehand* what my customers'll ask for—which way the wind'll blow. I couldn't do it, though, without a sort of barometer. And Radio Times advertising has been my 'weather forecast' for years now.

"Take these two products. Number One has been having whole page ads in the Radio Times every fortnight or so. Real eye-catchers. (Caught my wife's eye, incidentally!)

"So I reckon Number One should sell twice as fast as Number Two. And it does. My Radio Times tells me what's a best-seller—what'll *stay* a best-seller—what I can put in the front of my windows and my counter. And it's never led me astray yet!"

Is it on the Radio Times List?

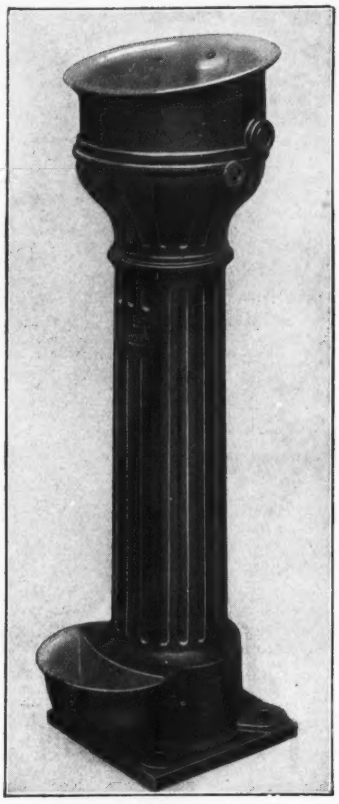
•

The following products from your trade are regularly advertised in the Radio Times and are therefore assured of a constant demand. CROMPTON LAMPS FERRANTI ELECTRIC CLOCKS • GOBLIN VACUUM CLEANERS • HOOVER VACUUM CLEANERS • SINGER ELECTRIC SEWING MACHINES • SWAN BRAND ELECTRICAL APPLIANCES • AERIALITE COMPONENTS BUSH RECEIVERS • DRYDEX BATTERIES EVER-READY BATTERIES • EVER-READY RECEIVERS • EXIDE ACCUMULATORS H.M.V. RECEIVERS • MARCONIPHONE RECEIVERS • MURPHY RECEIVERS • PIX COMPONENTS • VIDOR BATTERIES VIDOR RECEIVERS

RADIO TIMES

GUARANTEED AVERAGE WEEKLY NET SALES FOR 1938: 3,000,000 • MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

GLENFIELD HYGIENIC DRINKING FOUNTAINS



THESE Hygienic Drinking Fountains are designed for public use and are specially suitable for installation in parks, bathing ponds, schools and factories where many people use the same drinking supply.

They are strongly made in best quality cast iron with a bowl porcelain enamelled on the inside, and fitted with a nickel-plated nozzle so inclined as to cause waste water to fall clear of the issuing supply.

A patent non-concussive self-closing tap operated by push-button regulates the discharge, and the height of the jet can be adjusted to suit the water pressure in the main.

The pillar type of drinking fountain illustrated is our Fig. D110 with dog basin, but we also make fountains suitable for wall mounting.

Write for further particulars and prices which will gladly be sent on request.

WE INVITE YOU TO VISIT OUR PAVILION AT THE EMPIRE EXHIBITION

Glenfield

GLENFIELD AND KENNEDY LIMITED KILMARNOCK

HEAD OFFICE & WORKS — KILMARNOCK, SCOTLAND

E.L.R.2406

RENOLD-HARDY FLEXIBLE COUPLINGS

The CHEAPEST AND MOST EFFICIENT FORM OF FLEXIBLE COUPLING

Renold-Hardy Flexible Couplings are designed to absorb torsional vibration, shocks and impulses. Of robust construction they require no maintenance; their performance is unaffected by damp or dirt. Up to 600 H.P. from stock.

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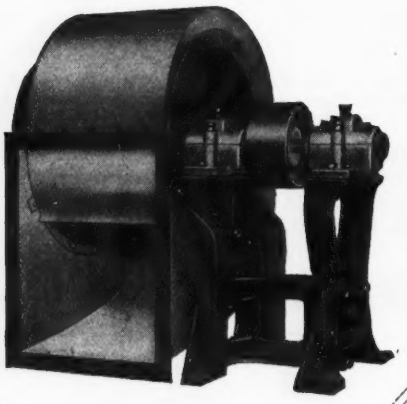

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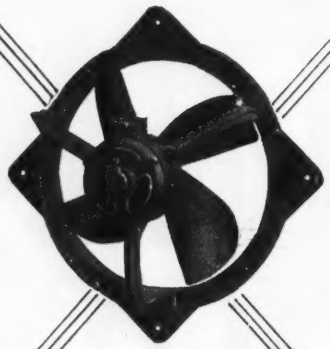

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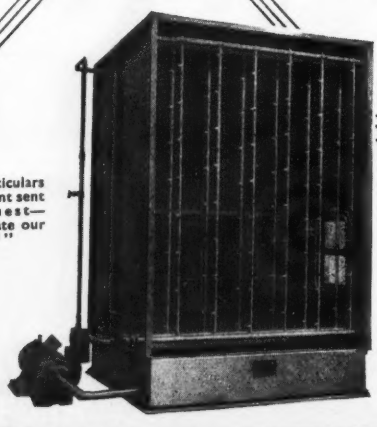

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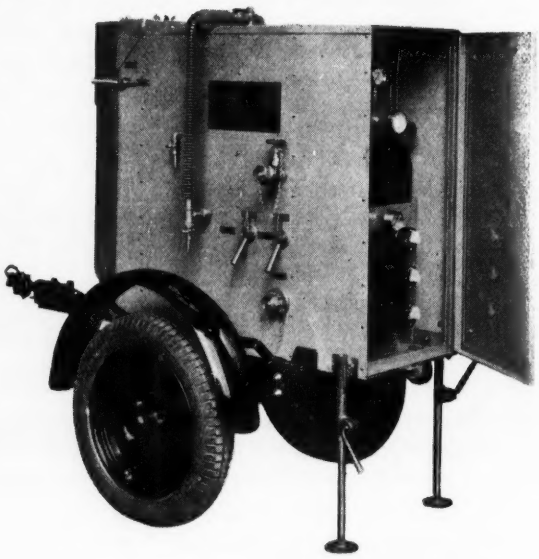

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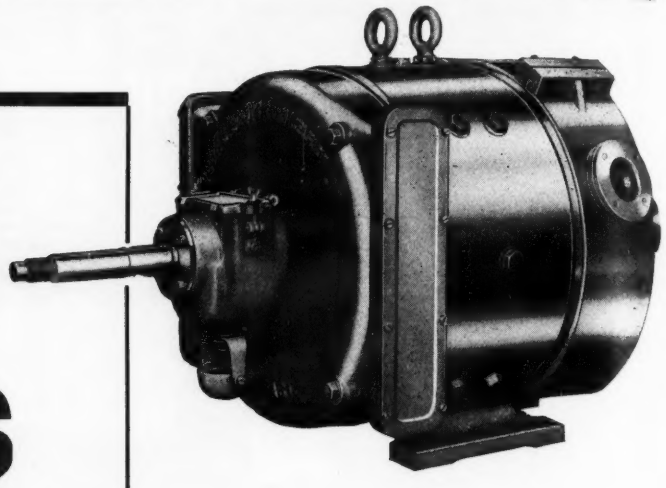

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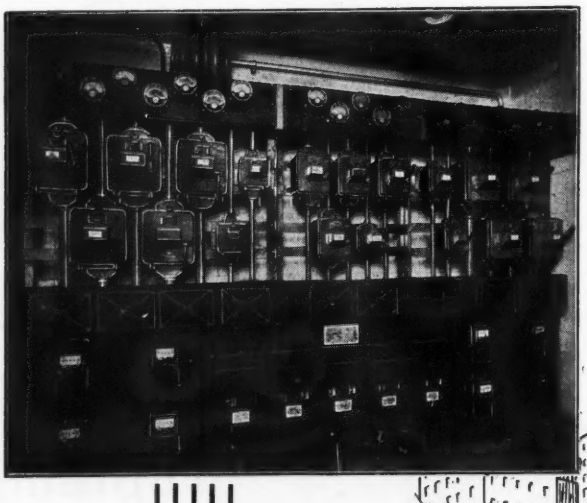

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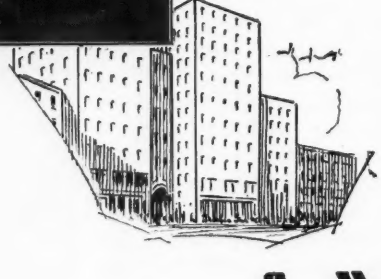

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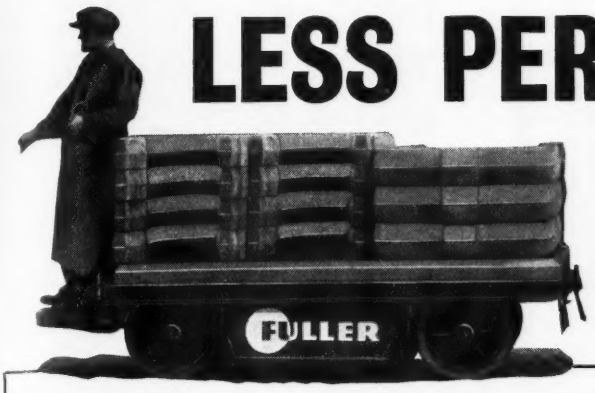

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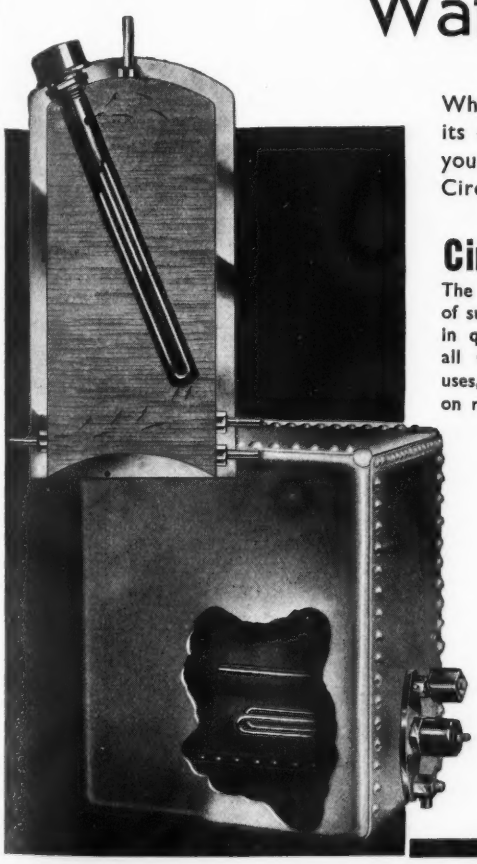

When you put in an electric water heating installation remember that upon its constantly efficient and trouble-free service depends to a great extent your future business with your customer. Advise and install Hotpoint Circulators or Immersion Heaters—and take no chances.

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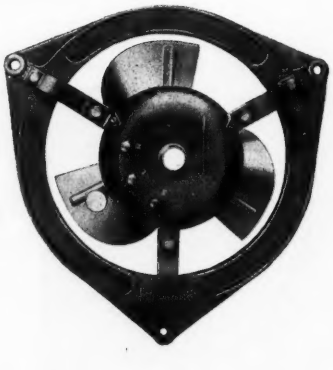

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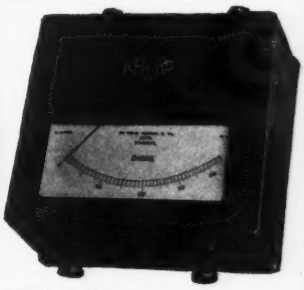

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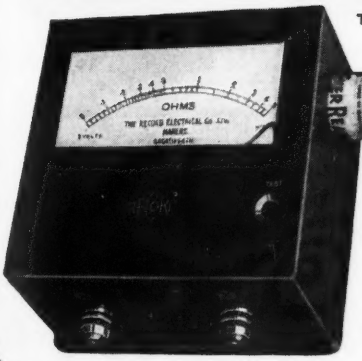

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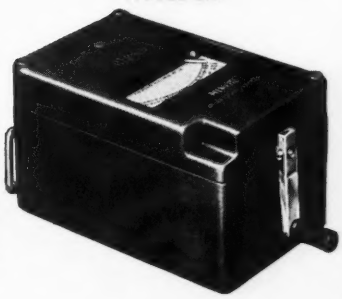

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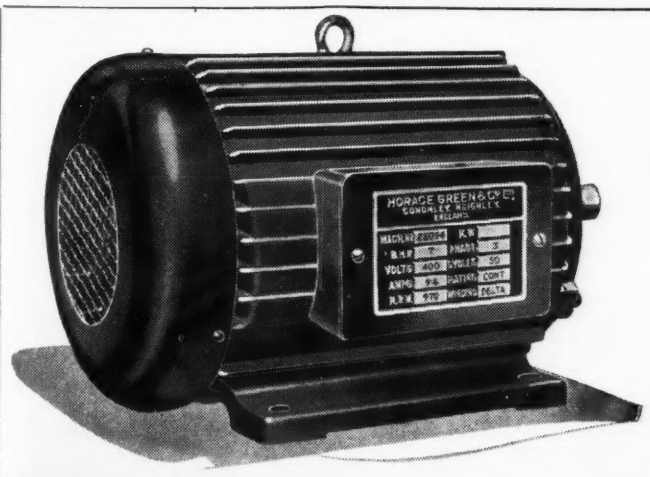

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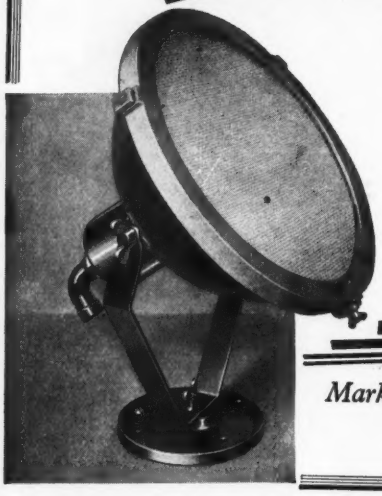

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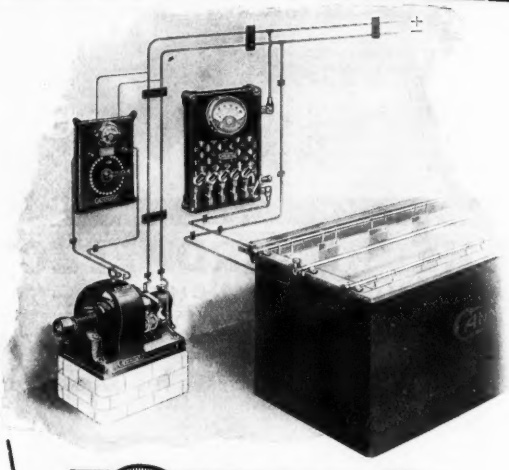

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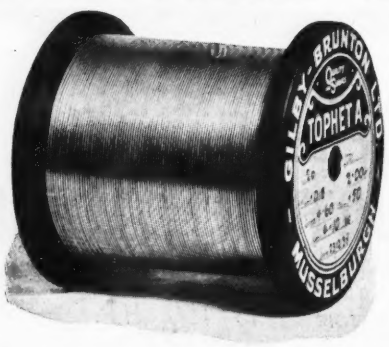

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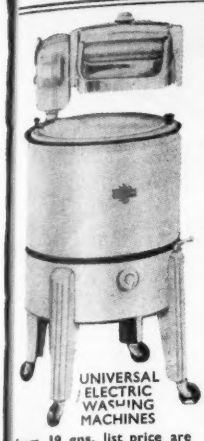

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If ever proof were needed that UNIVERSAL ELECTRIC WASHING MACHINES are the finest ever offered it is amply provided by the letters we receive from actual users. Here are extracts from three such testimonials which prove that only the test of time can offer you and your customers complete satisfaction and security.

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AUTOMATIC STREAMLINED HEAT CONTROLLED IRON
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Full technical details can be obtained on application.

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THREAD-CUTTING SCREWS

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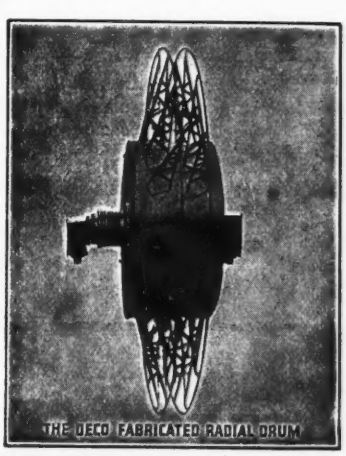

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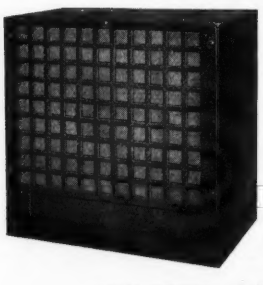

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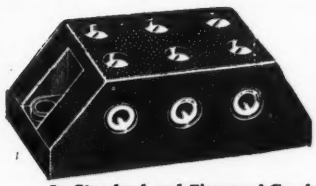

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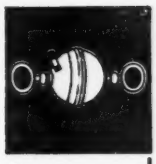

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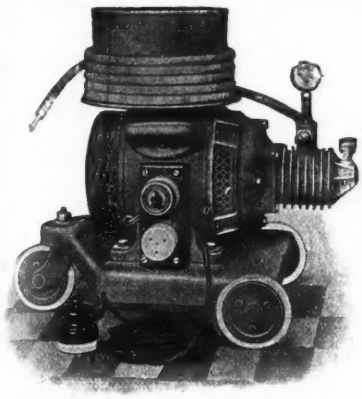

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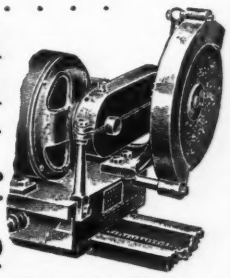

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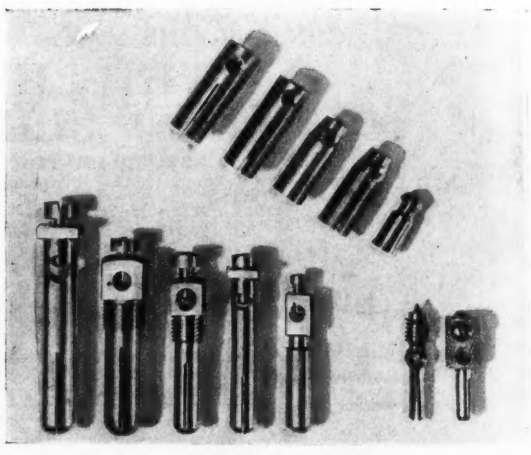

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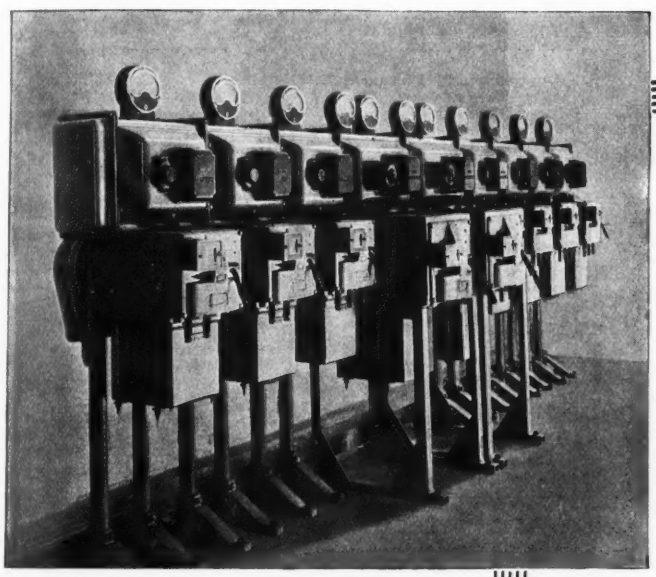

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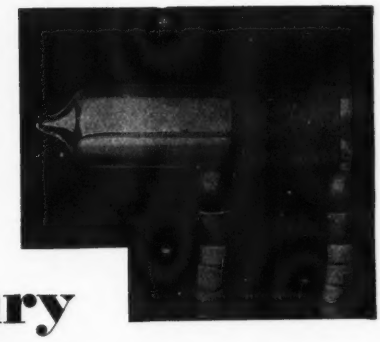

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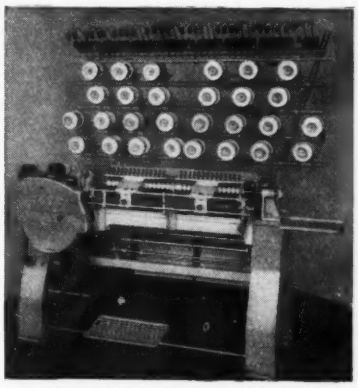

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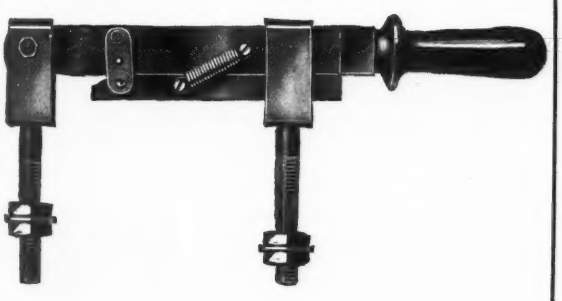

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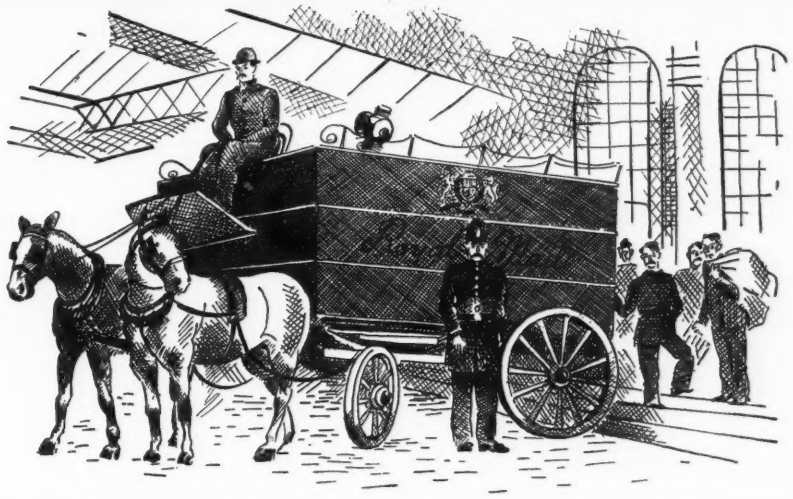

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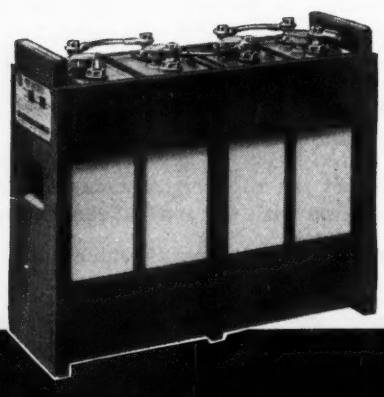

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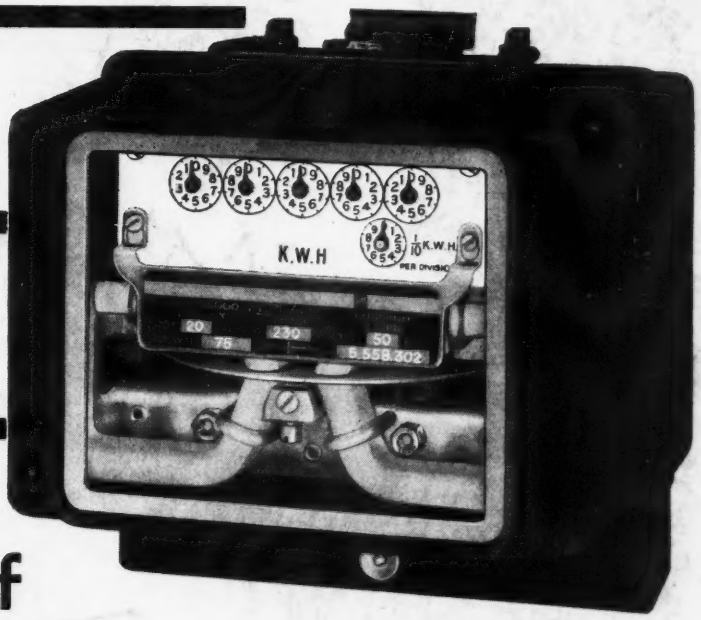

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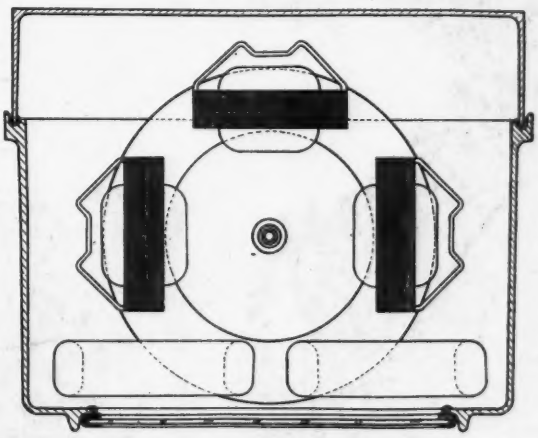

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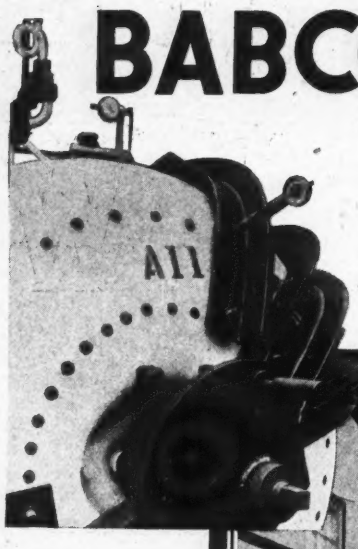

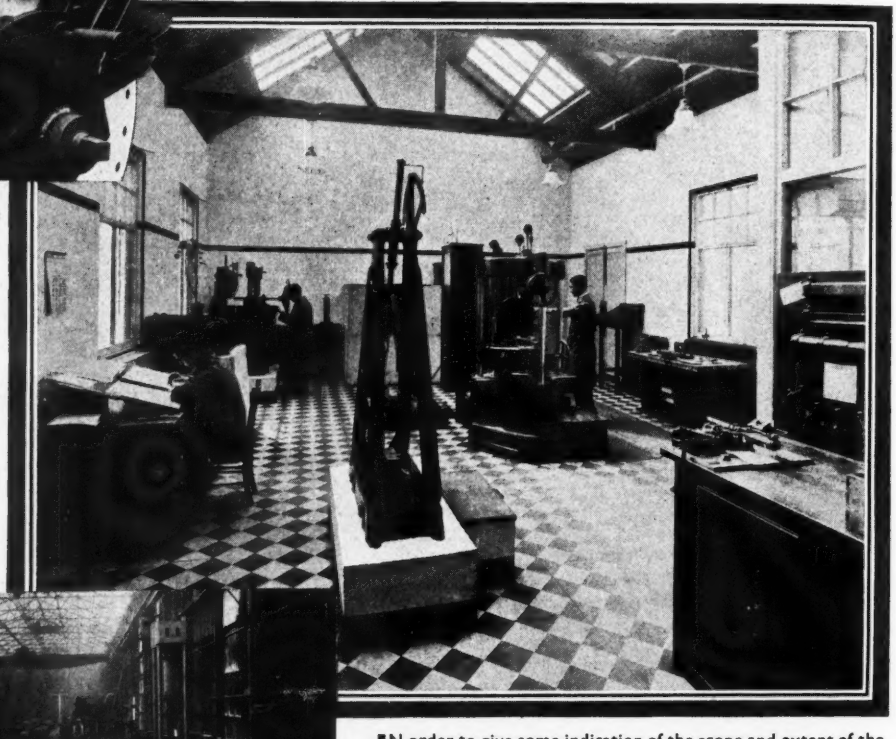

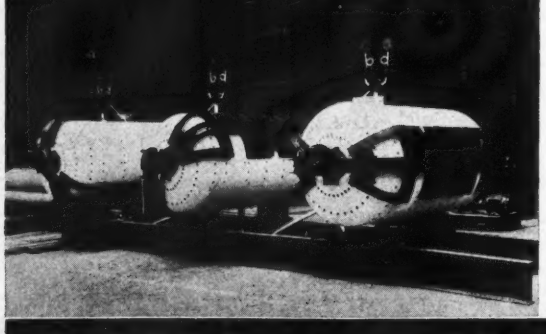

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